

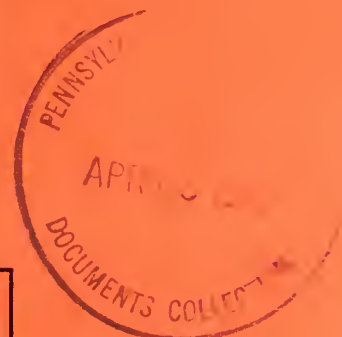
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VOLUME 2

NO. 4

JANUARY-FEBRUARY 1978

FIRE TECHNOLOGY ABSTRACTS



U.S. DEPARTMENT OF COMMERCE

U.S. Fire Administration

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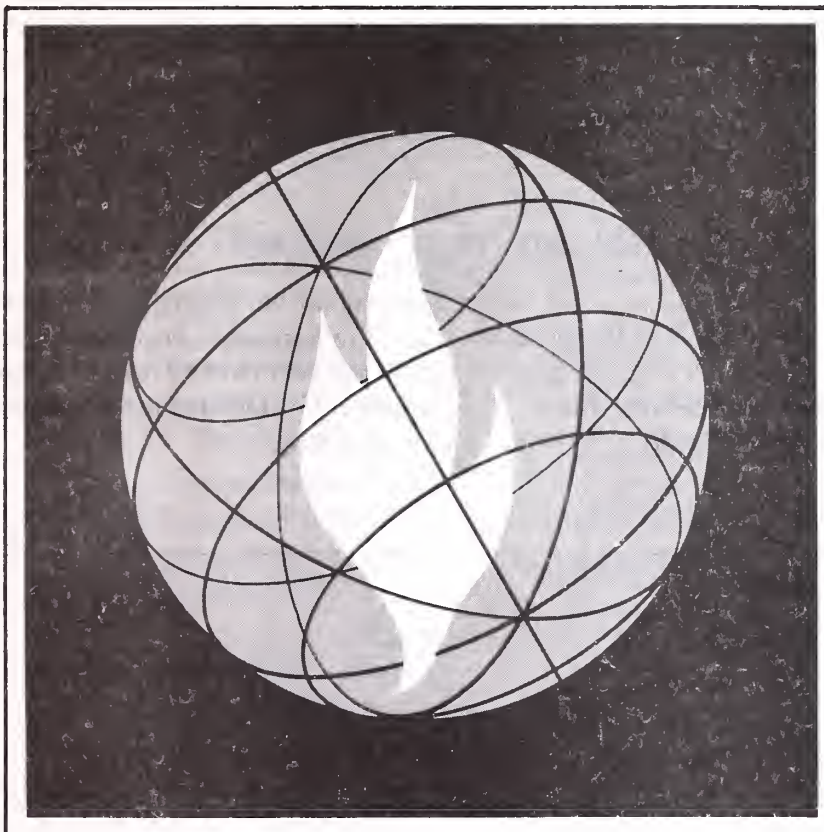
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U.S. DEPARTMENT OF COMMERCE

U.S. Fire Administration

Fire Reference Service

Prepared by
Applied Physics Laboratory
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FIRE TECHNOLOGY ABSTRACTS

Fire Technology Abstracts is an abstracts journal being prepared bimonthly by the Fire Problems Program Group of the Applied Physics Laboratory of the Johns Hopkins University, Laurel, Maryland, USA, under the sponsorship of the U.S. Fire Administration (formerly the National Fire Prevention and Control Administration) of the U.S. Department of Commerce.

SCOPE AND COVERAGE

The aim of *Fire Technology Abstracts* is to provide comprehensive reference to the applied fire literature in the broad range of topics outlined in the "Table of Contents." Most topics are covered fully; a few topics, such as forest fires and mine fires, are referenced selectively, because they are covered systematically in other specialized indexing and abstracting serials. For such topics an appropriate notice has been entered under the respective category.

The information contained in *Fire Technology Abstracts* has been gleaned from a wide variety of sources (journals, books, reports, patents, codes, and standards), with particular emphasis on the report and patent literature, for which referencing heretofore has been inadequate. Although the English-language literature comprises the majority of the entries, the coverage includes selections from the world fire literature, identified in part through such sources as *HSL Abstracts* of the Health and Safety Laboratories (UK), identified in the abstracts as (HSL), the Soviet *Abstracts Journal*, Series 68, "Fire Protection," identified as (RZh), and the card abstracts issued monthly by the Fire Literature Documentation Section of the German Fire Technology Research Center at the University of Karlsruhe, identified as (Fachdok).

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ARRANGEMENT

The journal is arranged in two sections: Abstracts and Indexes.

The *Abstracts* section contains complete bibliographic description required for identification of the item, along with a brief description of the contents of the item, usually consisting of the author's abstract, summary, or conclusions. The patents entries contain, in addition, citations of the patent classes, in most cases in accordance with the international classification system, in some cases preceded by classes according to a national classification scheme, as well as filing and disclosure dates, priorities and, if available, assignees. The abstracts are classified under the 13 main categories listed in the "Table of Contents" and a suitable number of subcategories, which are subject to revision as the necessity for finer classification

arises. The page-keyed categories and subcategories of the "Table of Contents" are repeated on the appropriate pages in the abstracts section to assist the reader in rapid identification of the topical field of interest. Whenever available, the affiliation of the principal author has been entered in parentheses.

The *Index* section consists of four indexes: author, subject, source, and report number. Each entry in each index is keyed to an abstract number. Annual cumulative indexes will be published.

The *Author Index* is an alphabetical list of all authors cited in the abstracts section, whether principal or secondary.

The *Subject Index* entries consist of up to three hierarchic descriptive levels to characterize the nature of the subject content.

The *Source Index* displays citations in alphabetical order of the sources under the headings: Books, Codes, Conferences, Congresses, Dissertations, Journals, Meetings, Patents, Reports, Seminars, Standards, and Symposia.

The *Report Index* lists in alphanumeric order the numbers of all the reports entered in each issue, including multiple numbers, as well as the accession numbers under which reports are available from document repositories.

These indexes (as indeed the entire journal) are prepared on an IBM 360/91 computer, using the INFO-360 Document Writing Package of programs developed at the Applied Physics Laboratory. The final edited file is reformatted to drive a photocomposing machine. All but the subject index are produced directly from the printed portion of the entries. The subject index terms are typed in at the ends of the abstracts, but are not printed in the body of the journal. Author affiliations, whenever available, are also included in the records. Except for the primary author's affiliation, however, these are not printed, but are reserved for future use. Upon completion of an issue, the file is reformatted and coded to drive a Linotron photocomposing machine.

AVAILABILITY

Fire Technology Abstracts is a literature announcement service only and cannot respond to requests for the documents announced in the journal. For all literature citations an effort is made to provide the information needed by the reader to acquire the document. In general, however, the full text of many of the journal articles cited in the *FTA* can be purchased through the Original Article Tear Sheet service (registered trademark OATS) of the Institute for Scientific Information (registered ISI) in Philadelphia, PA. The full text of those abstracts terminating with (Fachdok plus number) can be purchased by citing the number and ordering from the Documentation Center of

the German Fire Technology Research Center in Karlsruhe, FRG. The addresses of these two organizations are given below.

For *books, monographs, conference papers, and proceedings* the source is, in most cases, either the publisher or the sponsoring organization.

Dissertations are available in xerographic copy from University Microfilms of Ann Arbor, Michigan.

Patents, both domestic and foreign, can be obtained from the US Patent Office.

US Reports are available for a fee from the National Technical Information Service (NTIS) or from the US Government Printing Office (GPO). If availability is not indicated, the issuing organization should be queried.

ADDRESSES

NTIS	National Technical Information Service 5285 Port Royal Road PO Box 1553 Springfield, VA 22161
Fachdok	Forschungsstelle fuer Brandschutztechnik an der Universitaet Karlsruhe (T.H.) Abteilung Fachdokumentation 7500 Karlsruhe Hertzstrasse 16, Postfach 6380 Federal Republic of Germany
Firebase	Firebase Operations Center Boise Interagency Fire Center 3905 Vista Avenue Boise, ID 83705 Telephone: (208) 384 9457 FTS: 554 9457
GPO	Superintendent of Documents US Government Printing Office Washington, DC 20402
NFPCA	See USFA address below.
OATS	Institute for Scientific Information 325 Chestnut Street Philadelphia, PA 19106
Pat Off	Commissioner of Patents and Trademarks Washington, DC 20231
SFPE	Society of Fire Protection Engineers 60 Batterymarch Street Boston, MA 02110
USFA	US Fire Administration National Fire Reference Service US Department of Commerce Washington, DC 20230
Univ Micro	University Microfilms 300 North Zeeb Road Ann Arbor, MI 48106

FIRE TECHNOLOGY ABSTRACTS

Volume 2, Number 4

January-February 1978

1. GENERAL

a. FIRE PROTECTION ORGANIZATION

1037. Anon
THE BRITISH FIRE PROTECTION SYSTEMS ASSOCIATION
Fire Prev; (122):28-30, 1977

The history, organization, and activities of the British Fire Protection Systems Association Ltd (BFPSA), which represents manufacturers and installers of fire alarms and fixed fire extinguishing systems in the UK, are described. The main objectives of the association are to improve the quality and performance of such equipment, to express the collective views of its members, especially with regard to legislation and standards, both at home and abroad, to encourage the specialist education of people in the industry and to stimulate the study of techniques and equipment. The activities summarized in the article relate to continuing studies of fire protection equipment (the fire detection and alarms executive committee and the fire extinguishing systems executive committee), the association's involvement with the British Standards Institute, the European Standardization Committee (ISO), and close ties with European trade associations. 2 photos.

b. MEETINGS AND PROFESSIONAL ACTIVITIES

1038. Cumming HJ (Ed) [Univ San Francisco, CA, Fire Safety Center]
FIRE SAFETY
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA
Sponsor: Univ San Francisco, Fire Safety Center

The Second International Conference on Fire Safety, the second of a planned series of annual conferences on the subject of fire safety, was held at the McLaren Center of the University of San Francisco on January 24 to 28, 1977. The 91 participants in the nine sessions of the Conference (Fire Safety in the Home, Fire Safety in Transportation, General, Fire Services, Polymers for Improved Fire Safety, Smoke Evolution, Heat Release, and Fire Toxicity) heard 41 papers, 24 of which are presented in this Proceedings volume. Many of these papers have been published in various journals and have already been announced in *FTA*. For this reason, all the papers are entered in this issue of *FTA*, but abstracts are provided only for those papers not yet reviewed. (This volume of proceedings is marked as Vol 2, to set it off from the proceedings of the first conference, which were contained in Vol 1.) 572 pages.

1039. Wise MK (Ed)
INTERNATIONAL ASSOCIATION OF FIRE CHIEFS, METROPOLITAN COMMITTEE, SPRING CONFERENCE
International Association of Fire Chiefs, Metropolitan Committee Conf, Spring, Presentations; 1977, May 21-23, Minneapolis, MN
Sponsor: International Association of Fire Chiefs

Ten presentations to the 1977 Spring Conference of the International Association of Fire Chiefs, Metropolitan Committee, are given, as follows: Public Relations Using Multi-Media; A Case Study of a Successful Recruiting/Selection Program; Organization for High-Rise Firefighting; Report on IAFC Foundation Physical Fitness Program; Labor Relations; 911 Presentation (emergency reporting system); Canadian Code Formulation, Inter-Code Relationship and Adoption at Provincial Government Level; Applications of 3M Brand Heat Scanner; Update and Projection of NFPCA Activities; Seattle's Arson Task Force; Fire Company Manning - Panel Discussion; National Fire Training Academy; and Fire Service Telecommunication. 223 pages.

1040. Anon
POLICY LEADERSHIP IN FIRE PROTECTION
Policy Leadership in Fire Protection Conf, Annual, Third, Summary Conf Proc; 1977, Oct 24-26, St Louis, MO
Sponsor: Nat Fire Prev and Control Admin

Summary reports of the proceedings of the Third Annual Policy Leadership in Fire Protection Conference, devoted to a study of the policies that affect fire protection, are presented. The conference was divided into 6 sessions, each focusing on a general policy issue category, as follows: Session I: Overview of Policy Issues in Fire Protection; Session II: Policy Issues Associated with the Built Environment; Session III: Policy Issues in Fire Prevention; Session IV: Policy Issues in Fire Suppression; Session V: Dealing with Policy Problems of Fire Protection Leadership; and Session VI: Resolving Policy Issues (or What to Do When You Go Home). A list of conference participants is provided. 47 pages.

1041. Anon
A REVIEW OF THE TECHNICAL PAPERS PRESENTED AT THE IFE CONFERENCE
Fire Prot Rev; 40(445):19, 21, 23, 1977

The technical papers presented at the Institution of Fire Engineers (UK) Conference held in Brighton on September 28-29, 1977, are summarized. The five papers and their authors are as follows: JKS Clayton, "Purpose and

1. GENERAL

b. Meetings and Professional Activities—Continued

Scope of the Home Office Fire Research Programme"; H Higgins and R Nicholson, "Efficient Mobilising as an Aid to Fire Safety"; GB Scottford, "Current Research and the Young Fire Officer"; HD Barnard, EW Gilbreth, and CC Murhall, "The Development of a Superior Form of Fire-Protective Cladding for Quarters at Ekofisk, Norwegian North Sea"; and A Konig, "Fire Safety Standards in Vancouver, Canada." (These papers are reviewed in this issue of *FTA*; consult the source index under the journal *Fire*, Suppl, 1977.)

1042. Anon

SYMPOSIUM ON POLICE AND FIREFIGHTER ARBITRATION IN NEW YORK STATE, HELD AT ALBANY, NEW YORK, ON DECEMBER 1-3, 1976. NY State Public Employment Relations Board, Albany, NY; NSF/RA-770102, 224 pages, Dec 1976
Availability: NTIS PB-270 094/6GA

This report presents an evaluation of a three-year experiment in which binding arbitration for police and fire disputes is initiated in the state of New York. Symposium attendees addressed the following: 1) the Kochan Study, a study of arbitration in the public sector; 2) the neutral's view of interest arbitration; 3) other states' experiences with arbitration; 4) the state administration's view of interest arbitration; 5) court review and scope of bargaining in interest arbitration; and 6) a circular view of government intervention. Appendixes include an evaluation of impasse procedures for police and firefighters in New York State; the Public Employment Relations Board's (PERB) recommendations to the legislature; and formal position papers submitted for the record. (Author)

1043. Anon

FIRE PROTECTION TECHNOLOGY SEMINAR

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA
Sponsor: Stanford Res Inst, Fire Prot Eng Group

The 8 papers and 3 critiques of the one-day Second Annual Fire Protection Technology Seminar are reported in this volume of Proceedings. The aim of the seminar is to attempt to show the relevance of some of the current fire research activities and the interpretive role of fire protection engineering, demonstrate how a fire protection engineer can encourage utilization of technology by translating research results into terms of application, and to give the fire service a chance to criticize the purpose, method, and usefulness of research output. To achieve these goals, a "utilization dialog" is introduced, intended to become a part of the seminar format. The 11 papers are reviewed individually and can be found by consulting the appropriate listings under "Seminars" in the Source Index. The Proceedings volume is provided with a foreword, welcoming address, critique, summary, and a list of participants. 168 pages.

1044. Bhatnagar VM (Ed) [*Alena Enterprises of Canada, Cornwall, Canada*]
FIRE RETARDANTS

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada (Published 1977)

Sponsor: Alena Enterprises of Canada

The 31 papers read at the 1976 Flammability and Fire Retardants Symposium are presented in this volume of Proceedings, 22 in full and 9 in summary form. Seven of the papers are reviewed in *Chem Abstracts* 87(20), 1977, one was abstracted in *FTA* 2(1/2) (abstract 166). The remaining papers of fire interest are abstracted in this issue of *FTA* and can be found in the Source Index by consulting the appropriate entry under Symposia. (The Volume of Proceedings is provided with author and subject indexes.) 263 pages.

c. LITERATURE AND NOTICES

1045. Dineen MP

GREAT FIRES OF AMERICA

Country Beautiful Corp, Waukesha, WI; 1st edit, 208 pages, 1977

The story of fires and firefighting in America, from Colonial days to the present, with particular attention devoted to the great fires, such as the Great Chicago Fire of 1871 to the civil-disturbance fires of Watts, Detroit, and Newark in the 1960s, among many others, is told in an easy-to-read, profusely illustrated text.

1046. Cannon DJ (Ed)

HERITAGE OF FLAMES

Artisan Books, Pound Ridge, NY; 1st edit, 372 pages, 1977

The story of man's constant vigilance and battle against fire is told in this profusely illustrated history of early American firefighting. It traces the origins of American firefighting from the first major conflagration in the colonies through the era of bucket and swab, the introduction of the earliest mechanical firefighting devices, and the development of the first fire engines. The establishment of the earliest fire companies and organized fire-prevention efforts through the revolutionary period to the end of the war of 1812 are documented.

1047. Adams GH

MUNICIPAL FIRE DEPARTMENTS (A BIBLIOGRAPHY WITH ABSTRACTS). Nat Tech Inf Service, Springfield, VA; NTIS/PS-76/0575, 228 pages, Aug 1977
Availability: NTIS

Materials are presented on civil fire companies involving stations, equipment, planning, methods, and personnel. The discussions cover operations; the selection and testing and training of firemen; pumps, ladders, hydrants, hoses, extinguishers, techniques, and vehicles; mathematical models and computerized technology; fire research on buildings, materials, and combustion; and toxic combustion products. Also reported are integrated municipal information systems, community facilities, regional planning, emergency services, protective clothing, fire rescue, and projects in specific urban localities. Reference is made to civil defense, but in general firefighting operations relating to ships, mines, aviation, and forests are excluded. (This updated bibliography contains 223 abstracts, 49 of which are new entries to the previous edition.) (Author)

1. GENERAL

c. Literature and Notices—Continued

1048. Lehmann EJ

MINE SAFETY. PART 1. FIRES AND EXPLOSIONS (A BIBLIOGRAPHY WITH ABSTRACTS). Nat Tech Inf Service, Springfield, VA; NTIS/PS-77/0678/1GA, 154 pages, Aug 1977

Availability: NTIS

The citations cover research on underground mine fires and explosions, as well as safety and prevention measures. The primary concern is with methane and coal dust explosions. Safety barriers, dust control, combustion products, fire sensors, fire suppression, metal spark inhibition, and dust explosions are all included. (This updated bibliography contains 149 abstracts, 38 of which are new entries to the previous edition.) (Author)

d. FIRE AND EXPLOSION INCIDENT CRITIQUES AND ANALYSES

1049. Best RL [Nat Fire Prot Assoc, Boston, MA, Fire Investigations Dept]

RECONSTRUCTION OF A TRAGEDY: THE BEVERLY HILLS SUPPER CLUB FIRE

National Fire Protection Association; 1st edit, 113 pages, 1977

The National Fire Protection Association (NFPA) Fire Investigations Department, in cooperation with the National Bureau of Standards (NBS) and the National Fire Prevention and Control Administration (NFPCA), investigated the Beverly Hills Supper Club fire in order to document and analyze significant factors responsible for the tragic loss of life. NFPA dispatched two investigators to the scene the day after the fire (May 29, 1977). A total of five NFPA specialists participated in the two-week, on-site investigation. Following this, data collection and analysis of the fire continued over a five-month period. This report, compiled in October, presents findings from these efforts.

1050. NFPA Fire Analysis Dept

BIMONTHLY FIRE RECORD

Fire J; 71(5):19-22, 1977

Fourteen accounts of typical important fires reported to the National Fire Protection Association are presented. All the fires but one occurred in 1977 in various properties, including manufacturing, educational, utility, industrial, and residential. In some instances the accounts are based on preliminary reports, which are subject to verification. Given in most accounts are a brief description of the property, circumstances surrounding outbreak of the fire, firefighting tactics, investigative measures, damages and losses. 3 photos.

1051. Anon

A STUDY OF THE FLAMMABILITY OF CARPETS

Fire Prev; (122):12-17, 1977

There were only 1118 fires in UK buildings in 1973 in which floor coverings were first ignited, about 1% of all fires in buildings. With increasing affluence, however, the use of carpets has expanded and has probably contributed to the increasing severity of domestic fires. In recent years carpets have been recognized as major contributors to fire spread. The type of carpets being used

has changed, wool and rayon being replaced by acrylic, polyamide, polyester, and polypropylene. Work in the early 1960s showed that, in the UK, the incidence of carpet fires was growing faster than their estimated use, but no consistent relationship had emerged between the type of carpet and its ignition and burning characteristics when subjected to prescribed tests, as described in this article. The carpet fire aspects reported here include ignition by small sources, the pill test, the hot nut test, research at the UK Rubber and Plastics Research Association, carpet backings, flame retardants, fire spread in tunnels, the Steiner tunnel test, and radiant effects. US and UK experience are compared. 2 figs, 2 tables, 22 refs.

1052. Anon

CAUSES OF FIRE OUTBREAK IN PETROCHEMICAL COMPLEXES

Haikan to Sochi; 17(4):8-14, 1977 (Japanese)

A detailed, hierarchical classification scheme is given for the most typical causes leading to the outbreak of fires and explosions in oil-refining and petrochemical complexes, as well as in various fixed storage tanks for fire-hazardous petroleum products. The classification is made on the basis of an analysis of statistical data for Japan and a number of countries in Southeast Asia. Within the framework of the classification recommendations are made on the prevention of the corresponding fire- and explosion-hazardous situations. Also communicated are data on the main and most effective trends in organizational and technical activity to increase fire safety. (RZh)

e. FIRE SCIENCE EDUCATION

f. LEGISLATION

1053. Ryan JV [Consumer Prod Safety Commission]

A CPSC FIRE PROGRAM; Paper No. 1.3

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 128-142

Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 38 in *FTA* 2(1/2).

1054. MacKay WD [Alberta Fire Marshal, Canada]

NEW ALBERTA LEGISLATION

Fire Fighting Canada; 21(5):38-39, 42, 1977

Legislation regarding the installation of at least one approved smoke detector in each dwelling of all residential buildings, except existing one- and two-family dwellings, in the Province of Alberta, Canada, has been passed this year (1977) and will become fully effective on January 1, 1979. The detector is to be located between the bedroom areas and the remainder of the unit. If more than one sleeping area exists, additional alarms will be necessary. (Paper presented at the 69th Annual Canadian Fire Chiefs' Association Conference held in Quebec on 22 August, 1977.)

1055. Anon

CALIFORNIA'S FIRE SERVICES: NEW RESPONSIBILITIES AND OLD PROBLEMS. California Assembly Select Comm on Fire Services, Sacramento, CA; Unnumbered, 40 pages, Dec 1976

Availability: NTIS PB-268 442/1GA

1. GENERAL

f. Legislation—Continued

In a previous report the most startling discovery was that California's fire services have virtually been ignored during the past decades but their responsibilities have grown as California continued to grow in population and complexity. This report reflects the findings of the Assembly Select Committee on Fire Services as a result of hearings held during interim study in the fall of 1976. It is the third study in a series of reports to be submitted to the State Legislature on California's fire protection. (Author)

g. PUBLIC EDUCATION AND INFORMATION

1056. NFPA Fire Investigation Dept
ARE THEY BEING LOCKED UP — TO BURN?
Fire Command; 44(12):25-27, 1977

Lack of fire safety training, delayed discovery, or lack of automatic extinguishing equipment have been identified as the chief factors contributing to serious fires in penal and other institutions. The National Fire Protection Association, in order to instill a stronger commitment to fire safety in prison officials, has prepared a package of informational materials, portions of which are extracted in this article, including a life safety check list. 1 photo.

1057. Shubani V
FIRE AND LOSS REDUCTION
Pozhar Delo; (3):24-25, 1977 (Russian)

An annual decrease in the number of fires and in fire losses has been observed in the Kuibyshev District (USSR). This decrease has been a result of an improvement in prevention activity, comprising the following measures: increasing the number of personnel involved in preventive work to 23-27% of the total staff; stimulation of fire-engineering commission activity in plants; raising the quality of fire safety training of the blue- and white-collar workers; increasing the number of supervisory personnel with middle and advanced education to 90%; organizing group extracurricular training of instructors' assistants; holding scientific and technical conferences on standardization; and broad introduction of automatic fire protection systems. (RZh)

1058. Gottlieb IM [*Widener College, Chester, PA*]
FIRE PREVENTION AND PROTECTION — AN ENVIRONMENTAL PROBLEM
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 160-165
Sponsor: Alena Enterprises of Canada

Fire prevention and protection are identified by the author as an environmental problem, the solution of which should be accelerated. To do so, it is proposed that organizations be set up to act as clearinghouses to coordinate and monitor the various research developments related to fire prevention and protection, encompassing the dissemination to and education of the public for fire-hazard awareness, consciousness, and protection. The program should be subdivided into 6 major categories: 1) review, compilation, correlation, and cross-indexing of all regulations relating to building codes and articles of apparel, making them meaningful to the public; 2) devising laboratory testing to reflect end-use requirements; 3)

promoting the study of the flammability characteristics of the various textile substrates and construction materials; 3) promoting the study of the flammability characteristics of the various textile substrates and construction materials; 4) correlation of test methods, research requirements, materials, and functional finishes to design or correct end-use consumer systems; 5) fundamental laboratory-type research on the thermal decomposition mechanism; and 6) development of consumer awareness and education. Priorities are suggested for residences (single, double family, and multiple family) and for industrial and commercial targets. 20 refs.

h. RESEARCH AND DEVELOPMENT PROGRAMS

1059. Clayton JKS [*Home Office, UK, Scientific Advisory Branch*]
HOME OFFICE PROGRAMME OF FIRE RESEARCH
Fire; 70(Suppl):29-30, 1977

This paper was presented at the annual conference of the Institution of Fire Engineers (UK) held at Brighton on September 28-29, 1977. For a review of the paper, consult the Source Index under *Fire Eng J*, 37(108):20-24, 1977. 1 table.

1060. Scotford GB [*Hampshire Fire Brigade, UK*]
CURRENT RESEARCH AND THE YOUNG OFFICER
Fire; 70(Suppl):33-35, 1977

This paper was presented at the annual conference of the Institution of Fire Engineers (UK) held at Brighton on September 28-29, 1977. For a review of the paper, consult the Source Index under *Fire Eng J*, 37(108):25-29, 1977.

1061. Clayton JKS [*Home Office, UK, Scientific Advisory Branch*]
PURPOSE AND SCOPE OF HOME OFFICE RESEARCH
Fire Eng J; 37(108):20-24, 1977

Following a brief introduction into the philosophy, organization, formulation and implementation of fire research sponsored by the Home Office (UK), the program proper, divided into seven research areas, is outlined in a table, which also gives the planned deployment of scientific staff and extramural spending, viz: 1) resource allocation (higher management strategy); 2) fire prevention and protection (the fireground, or potential fireground, before the brigade is involved); 3) fire brigade organization and personnel; 4) firefighting equipment, extinguishing agents and tactics; 5) health hazards to firemen; 6) fundamental research; and 7) general scientific and supporting activities. These seven areas are elaborated upon and specific examples of studies are cited: control room studies; provision of information to firemen; health hazards and related studies (morbidity and mortality studies); and operational procedures and equipment, especially equipment for seeing through smoke (Infrasearch). (This paper was presented at the annual conference of the Institution of Fire Engineers (UK) held at Brighton on September 28-29, 1977.) 2 figs, 1 table.

1062. Ross NS [*Home Office, UK, Fire Department*]
THE HOME OFFICE FIRE RESEARCH PROGRAMME
Fire Eng J; 37(108):19, 1977

2. DYNAMICS AND MECHANICS OF FIRE

h. Research and Development Programs—Continued

The Home Office Fire Research Programme (UK) is intended to be of assistance to the fire service collectively and to those who serve in the fire service individually, as well as to serve the needs of Central Government, which provides the funds of around 0.5 million pounds a year. The Programme seeks to increase the effectiveness of firefighting and rescue operations by improving equipment design and operational practice. It is directed toward assisting fire brigades to improve the effectiveness of fire prevention and fire protection measures. It seeks to provide means to assist in the effective allocation of fire service resources and, finally, it aims to provide important information on health hazards to firemen. Formulation, implementation, research facilities and financing are discussed. (This paper was presented at the Annual Conference of the Institution of Fire Engineers (UK) held at Brighton on September 28-29, 1977.)

1063. Scotford GB [*Hampshire Fire Brigade, UK*]
A YOUNG OFFICER'S VIEWS ON RESEARCH
Fire Eng J; 37(108):25-29, 1977

Though the British Fire Service is lauded as being a nationally cohesive organization with high morale and quality of manpower and with a high standard of equipment, techniques and fire cover, it may be in danger of not keeping pace with the developing society in terms of fire protection measures, because the foundations on which the Service has grown date mainly from the late 1940s and early 1950s. Suggestions regarding usage of manpower (eg, patrolling outlying areas with 3- or 4-man crews on first-aid vehicles), re-evaluation of the Fire Service role (a division of manpower usage between operational and preventive fields, with alternation of personnel), the establishment of emergency teams of more experienced personnel to release and put into practice their particular techniques, greater opportunities for employment of women, and other measures are presented as subjects of investigation for improving the Fire Service. (Paper presented at the Annual Conference of the Institution of Fire Engineers (UK) held at Brighton on 28-29 September, 1977.) 9 refs.

1064. Ruzic NP [*National Space Inst, Washington, DC*]
SPACE TECHNOLOGY — A GIANT STEP FOR SAFETY
Nat Saf News; 116(6):61-64, 1977

The technology spin-off from the US national space program is reviewed, covering fire-resistant materials (3,500), firefighting systems, explosion prevention techniques, emergency escape devices and alarms, contamination control systems, anti-pollution methods, and specific industrial safety devices.

1065. Clark JE [*Nat Fire Prev and Control Admin, Washington, DC*]

RESEARCH UTILIZATION

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA
Sponsor: Stanford Res Inst, Fire Prot Eng Group

The theme of technology transfer to the fire service in fire protection technology research, the history of the Federal Government's rise to its present position in trying to reduce American fire losses, and the author's perceptions of how fire research could have increased the impact

on fire losses are reviewed in this paper by the Associate Administrator for Planning and Technology of the NFPCA. Described in particular is the part of the Administration's effort embodied in the research and technology program with its three major thrusts of technology development, regulatory impact studies, and planning and management research. The studies aimed at evaluating fire research utilization are discussed. 8 pages.

2. DYNAMICS AND MECHANICS OF FIRE

a. FIRE BUILDUP, PROPAGATION, AND SPREAD

1066. Danner M and Anselm D
SPREAD OF CARBURETOR FIRES IN PASSENGER CARS
Maschinenschaden; 50(2):61-66, 1977 (German)

In order to determine the time behavior of fires, fire tests were carried out on four different cars, three with front-mounted and one with rear-mounted engines. In all cars the origin of the fire was started in the carburetor and the road surface and various quantities of fuel were chosen as the fire parameters. The result showed that the flame front ignites the dashboard 8 to 10 min after outbreak of the fire in the case of a carburetor fire in a car with a front motor. Subsequently it took the fire a period of 1 to 3 min for complete ignition of the interior. In 5 more min the fire reached the trunk area. In a car with a rear engine the fire reached the dashboard in 7 1/2 min. 8 figs, 5 tables, 4 refs. (Fachdok 13/0838)

1067. Alger RS, Wiersma SJ, McKee RG, Johnson WH, Laughridge FI and Wiltshire LL
SHIP FIRE CHARACTERISTICS. PART 1. SEALED COMPARTMENTS. Nav Surface Wpns Center, White Oak Lab, Silver Spring, MD; NSWC/WOL TR 76-125, 72 pages, 35 figs, 10 tables, 5 refs, Nov 1976
Availability: NTIS

To optimize weight and cost of fire protection for aluminum ships, it is essential to know the characteristics of the fire threat. Fire behavior is a function of the fuel and environment, particularly of ventilation; therefore, fire characteristics are studied as a function of typical conditions aboard Navy ships. This report covers the first part of a series of experiments dealing with various ventilation conditions. Fire characteristics such as burning rate, fuel consumed, temporal and spatial heating patterns, and the O₂, CO₂, and CO concentrations at extinguishment were measured. With all class A and B fuels examined, flaming combustion stopped at oxygen concentrations of 10 to 15%. Factors such as pool size, compartment volume, and fire location had as much effect on the oxygen concentration for self-extinguishment as the oxygen index. Because fuel consumed has been proportional to available oxygen, the heat released and the thermal hazard can be estimated from compartment volume. Sealed compartments offer a simple, lightweight form of passive fire protection. The concept of spaces too small to flashover is explored with a simple model. This approach to passive fire protection is applied to the PHM-1 and to components suitable for general use. (Author)

2. DYNAMICS AND MECHANICS OF FIRE

a. Fire Buildup, Propagation, and Spread—Continued

1068. Parker WJ [Nat Bureau Standards, Washington, DC]

LABORATORY FIRE TEST METHODS AS INDICATORS OF FIRE GROWTH IN ROOMS

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA

Sponsor: Stanford Res Inst, Fire Prot Eng Group

The Fire Control Construction Program of the Fire Safety Engineering Division in the NBS Center for Fire Research is concerned with the effect of interior finish materials on fire growth in rooms, in particular, with the development of laboratory fire test methods and their use in the regulation of materials by the building codes. The NBS approach to standard fire tests for interior finish materials using the ASTM E-84-70 tunnel test, and ASTM E-162-67 radiant panel test, and the heat release rate calorimeter test is defined to 1) expose the material to a specified set of conditions; 2) describe their performance by some number; 3) use this number to rank materials; and 4) exclude all materials whose numbers lie above some critical number for a particular application. The future intent to develop a suitable analytical model to predict the fire growth in a room, to design the set of standard fire test methods necessary to provide the input data on the interior finish materials for the model, to check the accuracy of the model with full-scale room fire tests, and to use the model to determine how the severity of the fire varies with room size, type of ignition, etc, and prospects for the model are outlined. 14 pages, 1 fig, 9 refs.

b. FLAMMABILITY, IGNITION, AND EXTINCTION

c. FLOW OF COMBUSTION PRODUCTS

1069. Muraszew A and Fedele JB [The Aerospace Corp, Los Angeles, CA]

TRAJECTORY OF FIREBRANDS IN AND OUT OF FIRE WHIRLS

Combust Flame; 30(3):321-324, 1977

Firebrands which are generated from a fire front and carried by prevailing winds may become a source of spot fires impeding fire control and endangering men and equipment. A normal thermal convection column can only lift small embers which fall relatively close to the fire front (less than 500 ft), but fire whirls are characterized by high uplift velocities and the ability to generate long-distance firebrands. This brief communication addresses itself to the calculation of trajectories of long-range firebrands. 3 figs, 4 refs. (Author)

1070. Tamanini F [Factory Mutual Res Corp, Factory Mutual Syst, Norwood, MA]

REACTION RATES, AIR ENTRAINMENT AND RADIATION IN TURBULENT FIRE PLUMES

Combust Flame; 30(1):85-101, 1977

An improved version of the k-e-g model of turbulence is applied to the case of buoyancy controlled turbulent diffusion flames. The model accounts for the generation of turbulence due to the gravity field and describes the fluctuations of a conserved scalar quantity by introducing a polynomial probability density function (PDF). A combustion model is assumed which postulates infinitely fast

chemical kinetics and determines the local burning rate by solving for the source term the fuel conservation equation in which convection and diffusion of fuel have been determined from calculated profiles of mean fuel mass fraction. The local emission of radiation by the luminous flames considered in the study is assumed to be proportional to the local volumetric burning rate. Predictions of the radiation emitted by horizontal slices of the flame agree with experimental measurements. While flame heights are correctly predicted, the model underestimates the lateral spread of the flame, despite the fact that total agreement between experiment and model predictions was obtained in an earlier study for a nonreacting thermal plume. Model predictions of an effective flame radius, which is representative of the net width of the region where reaction is taking place, agree with the same quantity obtained from radiation measurements. Calculated values of the amount of oxygen entrained in the plume are presented and the implications of the result on simpler fire plume models are discussed. 7 figs, 3 tables, 23 refs. (Author)

1071. McCaffrey BJ and Rockett JA [Nat Bureau Standards, Washington, DC, Inst Appl Technol]

STATIC PRESSURE MEASUREMENTS OF ENCLOSURE FIRES

J Res NBS; 82(2):107-117, 1977

Some enclosure-fire static pressure measurements are presented for both full and scale model rooms and are compared with the present hydraulics-orifice flow model for fire-induced flows into and out of enclosures. Results indicate that the vertical pressure differential (enclosure to ambient) follows the expected hydrostatic distribution quite well and accurately reflects the doorway inflow and outflow gas velocities. Measurement of ceiling and floor differential pressure using different numbers of gas burners yields insight into gross plume entrainment and illustrates how the neutral plane and thermal discontinuity vary with upper gas temperature. Correlating upper gas temperature with fire size and enclosure height makes it possible to predict at what heat release rate a given enclosure might become fully involved, ie, by using the temperature at which the thermal discontinuity approaches the floor. In terms of present fire plume modeling large entrainment coefficients (0.3-0.4) are required in order to reproduce the enclosure flows for both the small-scale and large-scale results. A noted deficiency in the plume model appears in the small scale results where the data suggest that the entrainment should exhibit a much stronger dependence on the fuel injection rate than that predicted by the theory. 14 figs, 12 refs. (Author)

1072. Young DR and Jan T-K [Southern California Coastal Water Res Project, El Segundo, CA]

FIRE FALLOUT OF METALS OFF CALIFORNIA

Mar Pollut Bull; 8(5):109-112, 1977

Distinct increases were measured in dry aerial deposition rates of nine trace metals along the section of the southern California coast covered by a forest fire smoke plume. However, with the exception of iron, manganese, and lead, estimated inputs of metals to the coastal marine ecosystem via this route during both fire and nonfire periods were one to two orders of magnitude below those from the submarine discharge of municipal wastewater. 3 figs, 2 tables, 4 refs. (Author)

2. DYNAMICS AND MECHANICS OF FIRE

c. Flow of Combustion Products—Continued

1073. Handa T, Hamada T, Sugawa O, Fukaya H and Akiyama T
STUDIES OF THE MOTION AND THERMAL BEHAVIOR OF FIRE PRODUCTS THROUGH A FULL-SCALE CORRIDOR. EXPERIMENTAL STUDY OF HEAT FLOW THROUGH A FULL-SCALE CORRIDOR
Nihon Kasai Gakkai Ronbunshu; 26(2):1-16, 1977 (Japanese; English Summary)

The methods and results of experimental studies of the process of formation of temperature fields and gas formation in long corridors by burning wood cribs are described. The studies were carried out under actual spatial conditions in corridors measuring 13 x 1.5 x 2.5 and 70 x 3.3 x 1.8 m. The wood cribs weighed 5 and 20 kg and burned at a rate of 5 and 20 g/sec. Determined in addition to the temperature fields were the intensity of emission of the gaseous CO and CO₂ combustion products and their spatial characteristics. On the basis of the results, analytico-experimental relations between several parameters of the processes under study were obtained. 12 figs, 2 tables, 6 refs. (RZh)

1074. Handa T and Morita M
CHARACTERIZATION OF SMOKE MOTION IN BUILDING FIRES. PART 2. NUMERICAL SOLUTIONS OF THE HEAT FLOW PATTERN IN A FIRE
Nihon Kasai Gakkai Ronbunshu; 26(2):29-38, 1977 (Japanese; English Summary)

Mathematical formulations are given for analytical computer investigations which permit development of a method of using the theory of finite differences for machine calculation of heat transfer parameters to simulate a fire in building enclosures. An IBM/370 135 DHO digital computer is used for this purpose. It is shown that when the method is used on this model of a computer, the time required for the central processor to solve a typical problem (calculation of heat transfer parameters during burning in enclosures) does not exceed 30 min. Comparative results obtained by comparing an analytical calculation by the new method with experimental data for a problem with specific initial parameters are presented. The experimental data are in good agreement with the results of machine calculation. 13 figs, 7 refs. (RZh)

1075. Reiner J
FIRE GAS-AIR FLOWS THROUGH OPENINGS IN FIRE COMPARTMENTS
Rev Tech Feu; 18(167):74-78, 80-81, 1977 (French)

During a fire an exchange of fire gases and outer air is established through openings in compartments which influence fire development in the compartment and its effects on adjacent compartments. In evaluating these effects it is necessary to determine whether the fire gases being generated in the fire compartment are penetrating into an adjacent compartment or are being drawn directly outside. The volume of the exchange process is governed by the difference in pressure between the air in the burning and adjacent compartments. The pressure difference arises as a result of the temperature difference in these compartments and can be regulated by ventilation systems. The change in pressure at different temperatures is shown on curves obtained from the results of experi-

mental research; the change of the pressure difference in the burning and adjacent compartments is shown as a function of the temperature in the burning compartment. Formulas are given for determining the volume of the fire gases and the air, as are the location of the neutral plane between the fire-gas and air flows and other data relating to determining variables associated with the movement of fire gases and air, for which a specific example is given. 13 figs, 6 refs. (RZh)

1076. Seeger PG [Univ Karlsruhe, FRG, Fire Safety Eng Res Center]
AIR AND SMOKE GAS FLOWS IN A BUILDING IN CASE OF FIRE
VFDB Z; 26(3):90-99, 1977 (German; English and French Summaries)

Pressure differences stemming from the expansion of gases owing to a rise in temperature in the area of a fire, buoyancy inside the building, and wind forces on the building are responsible for the flow of air and smoke gases in a building. These effects can be determined by the laws of aerodynamics and thermodynamics. For some time there has not been a lack of effort to develop suitable technical methods of keeping escape routes free of smoke and therefore usable over a maximum period of time. The mechanism of air and smoke gas flows and methods of influencing these flows are examined. 10 figs, 1 table, 20 refs.

d. INSTRUMENTATION, METHODOLOGY, AND DATA PROCESSING

1077. Gaskill JR, Taylor RD, Ford HW, Jr and Miller HH [Univ California, Livermore, CA, Lawrence Livermore Lab]
DEVELOPMENT, CALIBRATION, AND USE OF A HIGH-FLUX HEATER IN THE NBS/LLL SMOKE CHAMBER; Paper No. 6.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 406-431
 Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 72 in *FTA* 2(1/2). 15 figs, 4 tables, 9 refs.

1078. Smith EE [Ohio State Univ, Columbus, OH, Dept Chem Eng]
RELEASE RATE TESTS AND THEIR APPLICATION; Paper No. 7.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 459-480
 Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 73 in *FTA* 2(1/2). 8 figs, 4 tables, 8 refs.

1079. Evans DD and Breden LH
A NUMERICAL TECHNIQUE TO CORRECT HEAT RELEASE RATE CALORIMETRY DATA FOR APPARATUS TIME DELAY. Nat Bureau Standards, Inst Appl Technol, Center for Fire Res, Washington, DC; NBSIR 77-1302, 20 pages, 5 figs, 5 refs, Nov 1977
 Availability: NTIS

A numerical scheme is presented to correct heat release rate measurements made with the Ohio State University

2. DYNAMICS AND MECHANICS OF FIRE

d. Instrumentation, Methodology, and Data Processing—Continued

rate of heat release apparatus for the effects of inherent time delays in the measurement system. The magnitude of the correction is shown to increase with increasing rate of change in heat release rate. Illustrative heat release rate curves for particle board and balsa wood show that corrections to the peak heat release rate of 40% and 130% respectively are necessary. Measurements of the apparatus time response to step changes in heat release rate are reported. A simple method of determining corrections to the measured peak heat release rate is discussed. (Author)

e. METEOROLOGY

f. RADIATION

1080. Modak AT and Croce PA [Factory Mutual Res Corp, Factory Mutual Syst, Norwood, MA]
PLASTIC POOL FIRES
Combust Flame; 30(3):251-265, 1977

Experimental results relating flame radiation feedback mechanisms to the burning behavior of 51 mm-thick, solid, horizontal, square, polymethylmethacrylate (PMMA) pools are discussed. Data for sizes ranging from 25 mm x 25 mm to 1.22 m x 1.22 m show that the burning rate per unit surface area of plastic pool fires increases with scale and is dominated, at the larger scales, by thermal radiation from the flames. The total radiative power output of the flames represents 42% of total heat release rate of the larger PMMA fires. Local burning rates for the larger plastic pools are maximum at pool center, corresponding to maximum radiative heat transfer from the flames, and decrease monotonically to the edge of the pool. Relatively long time periods are required to establish steady burning in the intermediate sized pools. The long "burn-in" time to reach steady state is associated with increasing radiative heat flux from the flames to the pool with time. The magnitude of the time-dependent radiative heat flux to the pool is calculated on the basis of a one-dimensional analysis for a semi-infinite slab. The variation of local burning rates along the pool surface is formulated in terms of a cylindrical flame model. Physical implications of the assumptions made in the analysis and their limitations are reviewed critically. 8 figs, 3 tables, 20 refs. (Author)

g. THERMAL CONDUCTIVITY

3. BEHAVIOR AND PROPERTIES OF MATERIALS

[For literature on fire and flame retardants, fire and flame proofing, etc see *Chemical Abstracts*.]

a. CHARACTERISTICS AND THERMAL BEHAVIOR OF MATERIALS

1081. Damant GH and Young MA [State of California Dept of Consumer Affairs, Bur Home Furnishings, Flammability Res Lab]
SMOLDERING CHARACTERISTICS OF FABRICS USED AS UPHOLSTERED FURNITURE COVERINGS; Paper No. 1.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 1-87
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see *FTA* 1(6), abstract 1971. 2 figs, 30 tables, 30 refs.

1082. Morford RH [Toyad Corp, Latrobe, PA]
THE FLAMMABILITY OF NEOPRENE CUSHIONING FOAM; Paper No. 2.3
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 299-312
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 105 in *FTA* 2(1/2). 3 figs, 7 tables, 12 refs.

1083. Chang EP, Kirsten R and Slagowski EL [Hooker Chemicals and Plastics Corp, Niagara Falls, NY, Hooker Res Center]
DYNAMIC MECHANICAL AND THERMAL PROPERTIES OF FIRE-RETARDANT HIGH-IMPACT POLYSTYRENE
J Appl Polym Sci; 21(8):2167-2180, 1977

The interaction of a series of fire retardant additives with high-impact polystyrene (HIPS) has been inferred from their dynamic mechanical and thermal properties. High-melting additives phase separate and act as inert filler in both the rubber and polystyrene phases, while low melting additives raise the T_g of the rubber phase and plasticize the polystyrene phase. Antimony oxide antiplasticizes the grafted rubber phase but acts as inert filler in the polystyrene phase. The impact strength of these fire-retardant HIPS's shows good correlation with the integrated loss tangent of the rubber T_g peak indicative of large energy dissipation in the rubbery region during impact causing the matrix to craze or flow. It is also suggested that additives which are compatible with, and localized in, the polystyrene phase help retain the impact strength of HIPS. 5 figs, 5 tables, 20 refs. (Author)

1084. Church JM [Columbia Univ, New York, NY, Dept Chem Eng]
THE SCIENTIFIC ASPECTS OF CLOTHING FIRES
J Prod Liability; 1(1):44-55, 1977

The scientific aspects of clothing fires are discussed in terms of the physical principles of fabric ignition, methods for the evaluation of the flammability of fabrics, including the Columbia 15° angle from vertical test method, and prevention of clothing fires by fire retardant treatment. 5 figs, 1 ref.

1085. Albrecht W
IS THE CONSTRUCTION OF TEXTILE FLOOR COVERINGS OF SIGNIFICANCE IN THEIR BEHAVIOR IN CASES OF BURNING?
Melliand Textilber (English Edit); 6(11):964-973, 1977

Extensive tests to determine the influence of the construction parameters of textile floor coverings on their burning behavior have been carried out. It was found that German Industrial Standard DIN 54 332 leads to a breakdown into burning classes which is useful in practice, but does not permit a distinction to be made between the effects of various structural elements of a floor covering, as does the refined method given here. Optimal filling of the pile volume with fibers is the desired goal, for which a suitable raw density of greater than 0.03 g/cm³ is derived, a low twist of the yarn in the pile, and a

3. BEHAVIOR AND PROPERTIES OF MATERIALS

a. Characteristics and Thermal Behavior of Materials—Continued

crimp of the fibers filling the space. The pile nap distribution should be maximally quadratic. These parameters are supported by fibers with appropriate fine deniers, a narrow pile nap arrangement, and a uniform pile surface. These structural elements, adapted to the burning behavior of the fiber substances, yield improved flammability resistance. 13 figs, 12 tables.

1086. Fabris HJ [*The General Tire and Rubber Co, Akron, OH, Res Div*]

FLAMMABILITY OF ELASTOMERIC MATERIALS
Rubber Chem Technol; 50(3):523-570, 1977

The use of synthetic polymeric materials in numerous consumer-oriented applications has increased rapidly over the past few decades. This trend has caused considerable concern regarding the responses of these materials to fire, and this concern has resulted in a flurry of activities by numerous agencies (private and government) directed toward better characterization of the flammability of man-made polymers, as well as toward regulations to reduce any potential hazard these materials may present. Reviewed in this paper is the present state of knowledge on the flammability behavior and the flame retardation of elastomers and elastomer compositions. Information on pyrolysis has been included wherever available. This extensive review article consists of the following sections: Introduction; Pyrolysis and Flame Retardation; Smoke and Toxicity; Flammability Testing; and Applications. 21 figs, 21 tables, 253 refs.

1087. Pless G

EVALUATING THE FIRE BEHAVIOR OF TEXTILES
Unser Brandschutz; 27(5):31-32, 1977 (German)

Fire tests of textiles have yielded the following results. The flammability of textiles is higher in the case of blends and composite materials than in the case of the raw materials. The spatial distribution has an extraordinarily strong influence on fire spread and intensity. The high intensities in blends result in a strong reduction of oxygen and therefore incomplete combustion and increased generation of soot and smoke. With thermally treated materials the fire often spreads in a flash, promoted by burning melted components. Fire temperatures of 1200°C plus occur. Instructions for firefighters in combating textile fires are given. 4 figs. (Fachdok 13/0896)

1088. Malhotra HL

THE BEHAVIOUR OF POLYMERS USED IN BUILDING CONSTRUCTION. *Fire Res Sta, Borehamwood, UK; Fire Res Note* 1071, 29 pages, 3 figs, 8 tables, 17 refs, Jul 1977

The note examines the use of different types of polymeric materials in the construction of buildings, for structural as well as nonstructural purposes, and indicates increasing applications in the future in most areas. After a brief look at general fire behavior the use of various standard fire tests is considered and the characteristics of a range of materials under selected "reaction to fire" headings are tabulated. The behavior of polymeric materials under natural fire conditions has been of concern and various "full-scale" studies have been carried out which are summarized at the end of the note. (Author)

1089. Ames WA [*Hardwood Plywood Manufacturers Assoc, Arlington, VA*]

FLAME SPREAD RATINGS ON WOOD COATINGS

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 180

Sponsor: Alena Enterprises of Canada

The paper covered the major acceptable test methods, the principal building code regulations affecting the use of hardwood plywood and other interior finish materials, and some of the factors that affect the flame spread performance of a panel — mainly the relationships between substrate properties and finish systems to flame spread. (Abstract only)

1090. Miller B [*Textile Res Inst, Princeton, NJ*]

THE CHEMISTRY OF POLYESTER-COTTON FLAMING COMBUSTION

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 117-129

Sponsor: Alena Enterprises of Canada

Experimental evidence and theoretical considerations strongly indicate that the combustion behavior of a mixed polymeric system is unlikely to be the "average" of the behaviors of its components. In the case of the economically important polyester-cotton blended fabrics this is quite evidently the case. Nearly all techniques for the quantitative evaluation of flammability reveal that some form of interaction occurs during burning of such systems. Most investigators have tended to explain this as the consequence of physical factors (ie, the scaffold effect). Little information is available as to whether or not there are chemical interactions taking place which could have a net effect on some aspect of the material's burning behavior. Using specialized pyrolysis techniques designed to simulate the thermal energy exposure during ignition and sustained burning, data have been collected describing the types and amounts of combustible and noncombustible volatiles emanating from various combinations of polyester and cotton, both untreated and flame retardant. Significant differences from what would be expected indicate that the behavior of these systems is modified by chemical reactions which take place between the two polymers or their decomposition products. (Abstract only.) (Author)

b. COMBUSTION, EXPLOSION, AND FLAMMABILITY TESTS AND METHODS

1091. Drews MJ, Yeh K and Barker RH [*Clemson Univ, Clemson, SC, College of Ind Management and Textile Sci*]

CALORIMETRIC EVALUATION OF FLAME RETARDANT FABRICS; Paper No. 7.3

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 481-493

Sponsor: Univ San Francisco, Fire Safety Center

Two techniques for the measurement of total heat evolution from flame-retardant fabrics based on the use of static oxygen bomb calorimetry and isoperibol calorimetry are described. Both methods have been found to be useful as probes into flame-retardant mechanisms and efficiency

3. BEHAVIOR AND PROPERTIES OF MATERIALS

b. Combustion, Explosion, and Flammability Tests And Methods—Continued

characteristics of flame-retardant treatments. 3 tables, 16 refs.

1092. Young RV, Garrett C and Simpson HN
EFFECTS OF CONSTRUCTION ON THE FLAMMABILITY OF CHILDREN'S SLEEPWEAR
Am Dyestuff Reporter; 66(1):34, 36, 38, 1977

Three flame-retardant fabrics, two thread types, and two seam types were used to construct prototype specimens and children's nightgowns. The prototype specimens were tested for flammability in accordance with DOC FF 3-71. The nightgowns were burned by impinging a 3-in. gas flame for 10 sec to the hemline edge. Measurements of after-flame, thread destruction, area of burn, and scorch length were also recorded. The cotton fabric passed the standard tests. The acetate blend and the polyester blend fabrics failed DOC FF 3-71 standard test by producing average char lengths that exceeded 7 in., by burning the entire length of the specimens, and by melting and dripping when tested, causing after-flame time failures. The spun polyester thread appeared less susceptible to burning than the corespun polyester/cotton thread. Seam type comparisons indicated that the plain seam exhibited better flame retardant properties than the overlock seam. 2 tables, 4 refs. (Author)

1093. Saito F [Japanese Government, Ministry of Construction, Tokyo, Japan, Build Res Inst]
FLAMMABILITY CHARACTERISTICS OF MATTRESSES
J Consumer Prod Flammability; 4(3):203-243, 1977

Described in this paper are the relationship between the manner in which mattresses are exposed to fires and their burning characteristics in the early stages of a fire. The paper consists of three parts: 1) establishment of a standard ignition source to simulate the sources of accidental fires; 2) flammability tests using ASTM D 1692; and 3) experiments with full-size mattresses. In the experiments with full-size mattresses, once the mattresses had been ignited, the fire spread with a bell-shaped burning zone of constant width and a flame of almost constant height (70-90 cm). The burning rate of mattresses with covering materials was slower than that of uncovered mattresses, because of the carbonized layer resulting from the cotton fabric cover. 45 figs, 5 tables, 3 refs. (Author)

1094. Cardillo P [Stazione Sperimentale per i Combustibili, San Donato Milanese, Italy]
MEASUREMENT OF THE FLAMMABILITY OF MATERIALS BY THE OXYGEN INDEX METHOD
Riv Combust; 31(4):122-126, 1977 (Italian)

The principle of the oxygen index method for measurement of the flammability of materials is reviewed. It is found that determination of the oxygen index can be used in two ways to obtain information on various characteristics: use of the method at ambient temperature indicates the potential hazard in the first stage of fire development, while at high temperature it can be used to evaluate the flammability of a material in the real situation. The complete flammability characteristics cannot be determined by these methods alone, but the oxygen index and the temperature index, together with other tests, provide some of the information required to determine the

acceptability or adaptability of individual materials for specific applications. 1 fig, 3 tables, 27 refs. (Author)

1095. Spivak SM, Block I, Smith BF, Yeh K and Bhat GR
EXTINGUISHABILITY AS A COMPONENT MEASURE OF FLAMMABILITY HAZARD. Univ Maryland, Dept Textiles and Consumer Economics, College Park, MD; NBS GCR-77-90, 180 pages, Apr 1977
Availability: NTIS PB-269 489/1GA

Extinguishability of flammable fabrics has been investigated under two separate basic and applied phases. Twenty-two fabrics have been investigated. The basic phase focused on the influence of extinction mechanisms which control burning behavior during extinguishment, and thus extinguishability. Mechanisms studied include effects of ambient oxygen concentration and placement of a heat sink in proximity to the flame. A modified TRI Flammability Analyzer was used. Results show that burning rate and heat flux vary linearly with oxygen concentration, and the general behavior of fiber type can be ascertained. Further analyses show the influence of both sensitivity to, and lower limits of, oxygen concentration as these influence burning behavior. Heat sink effects cause reductions in flammability with increasing impingement of the heat sink device. The applied phase concentrated on laboratory simulations of extinguishment strategies, ie, slapping out the flames and running to blow out the flames. In slapping, the test device consisted of two boards which could be closed onto a burning fabric. Numerous experimental variables influence these results. Thus, slapping is highly method dependent and may not be a good candidate as a simple test to assess extinguishability. A method of greater promise consisted of blowing air over burning fabric to simulate running. This utilized a controlled air flow directed at burning fabric mounted on an NBS Mushroom Apparel Flammability Tester (MAFT). (Author)

1096. Curtat M and Breyton AM [Societe Nationales des Poudres et Eplosifs, Centre de Recherches du Bouchet, France]
EXPRESSION OF THE FLAMMABILITY OF URETHANE FOAMS: CALCULATION OF TRANSFER NUMBERS FOR FIRE-RETARDED MATERIALS
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 13
Sponsor: Alena Enterprises of Canada

Determination of the flammability of materials has given rise to many experimental and theoretical works during the last ten years. As official and unofficial tests were more and more used for the measurement of flammability, ignitability, and extinguishability, physical expressions of these quantities were tentatively given. The flammability of several rigid urethane foams (fire-retarded and nonfire-retarded) is described in this paper from measurements of flame propagation velocity and mass loss rate. Examined are the influence on these parameters of the oxygen fraction in a flow apparatus similar to an OI apparatus, the size and shape of the sample, the direction of flame propagation, and the value of the initial sample temperature. The calculation of Spalding's B numbers and the application of the formula

3. BEHAVIOR AND PROPERTIES OF MATERIALS

b. Combustion, Explosion, and Flammability Tests And Methods—Continued

$$\dot{m}'' = \frac{h}{C_g} \ln(B + 1)$$

are attempted and numerical results are given. Using our results and the results from previous works of M Kanury, A Tewarson and other authors, we discuss the suitability of B numbers for the expression on flammability. (Abstract only available.) (Author)

1097. Redfern JP [Stanton Redcroft, London, UK]

APPLICATION OF THE CRITICAL OXYGEN TEST

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 11-12

Sponsor: Alena Enterprises of Canada

A summary description is given of a method which combines the critical oxygen index test with measurement of sample temperature, smoke density, and toxic gas emission by top ignition of a vertically clamped rod or sheet of material so that it burns in a candle-like manner in an upward flowing mixture of oxygen and nitrogen. 6 refs.

c. FIRE AND EXPLOSION HAZARDS OF MATERIALS

1098. Anon

STUDIES OF THE FIRE AND EXPLOSION HAZARDS OF GRANULAR MATERIALS

Keiso; 20(4):74-78, 1977 (Japanese)

The mechanism of formation of static electricity charges in loose materials is examined, and the method and results of studies of the fire hazard of such materials under various conditions are described. It is pointed out that loose materials which are electrified during production, separation, and transportation are not hazardous when stored in various containers because discharges occur mainly by conductivity of the loose materials. The possibility of ignition and explosion of combustible dust-air mixtures arises when one of the types of gas discharge occurs on the grounded walls and structural components of technological apparatus and storage containers. Granulated polypropylene (2.5 mm dia), emulsified polypropylene (160 microns dia) and suspended polystyrene (500 micron dia) were tested. The magnitude of the specific charge with which the tested material entered the hopper of the apparatus was determined from the balance of forces of the current measured on all the sections of the experimental apparatus for storage and the mass flow of these materials. It was found that the highest potentials are observed in pulsed discharges from the charged granulated polypropylene onto a grounded spherical electrode located above its surface in the center of the hopper. 4 figs, 3 tables, 2 refs. (RZh)

1099. Saito M, Kamikawaji M, Sakurai W, Nobuta K and Konishi F [Matsushita Electr Ind Co, Ltd, Osaka, Japan]

EVALUATION OF MATERIAL FLAMMABILITIES AND INSULATION CAPABILITY FOR FLAME-RESISTANT PLASTICS

Matsushita Electr Ind, Nat Tech Rep; 23(1):174-182, 1977 (Japanese; English Summary and Captions)

In order to be able to select more suitable flame-resistant plastics for household electrical appliances, an examination was made of such safety properties as flammability and insulation capability of existing plastics with various flame-resistant additives. From the experimental results it was found that by adding measurements such as "time to ignition" and "time to drip" to some suitable test method, it is possible to select the most appropriate materials which conform to the individual flammability requirements of each nation. Concerning insulation capability, it was found that materials with flame-resistant additives are much worse than materials without them. In particular, thermosetting materials with such additives have a higher possibility of producing tracking breakdown caused by reactions among the additives, by moisture, dust, and copper terminals of appliances, and by external heating due to overloading of components when terminals on the materials are electrically stressed. Moreover, it was found that continuous voltage application to such breakdown surfaces results in self-heating and ignition of the materials with a reduction of the surface resistance. In conclusion, for flame-resistant practices it is necessary to take precautions during appliance design to avoid unexpected hazards by recording changes of the track resistance and of the self-heating and ignition of the materials with a reduction of the surface resistance. In conclusion, for flame-resistant plastics it is necessary to take precautions during appliance design to avoid unexpected hazards by recording changes of the track resistance and of the self-heating temperature under electrically stressed conditions caused by circumstantial conditions such as temperature, humidity, and dust accumulation. 11 figs, 3 tables, 10 refs. (Author)

1100. Zborovszky Z

A COMPARISON OF TUNGSTEN AND COPPER HOT WIRE IGNITION CAPABILITY AND DISCHARGE DURATION IN THE IGNITION PROCESS OF EXPLOSIVE ATMOSPHERES IN TESTING APPARATUS. STUDY OF INTRINSIC SAFETY BASICS AND TESTING MACHINES. FINAL REPORT 1 DEC 74 — 28 FEB 76. Denver Res Inst, Denver, CO; BuMines OFR-116-77, 89 pages, Mar 1976

Availability: NTIS PB-269 583/1GA

An experimental study was directed toward gaining improved understanding of the exact mechanisms causing ignition in the PTB break-flash. Tungsten and copper wires were investigated and compared as to their ability to cause hot wire ignition. The importance of discharge duration in the ignition process was evaluated. The parameters influencing the duration of a discharge (minimum discharge voltage, purity of electrode materials, purity and properties of the gaseous atmosphere, contaminations, and deposits on the electrode surface) were studied. (Author)

3. BEHAVIOR AND PROPERTIES OF MATERIALS

c. Fire and Explosion Hazards of Materials—Continued

1101. Anthony EJ

THE DETERMINATION OF THE MINIMUM EXPLOSIBLE CONCENTRATION OF POLYVINYL CHLORIDE POWDER IN THE PRESENCE OF METHANE AND AIR.
Fire Res Sta, Borehamwood, UK; Fire Res Note 1072, 11 pages, 2 figs, 3 tables, 4 photos, 9 refs, Aug 1977

The preparation of unplasticized polyvinylchloride powder (PVC) by grinding can result in the release of vinylchloride into the head space of grinders, etc. Although PVC powder is nonexplosible in the standard tests for the explosibility of dust clouds, the combination of PVC powder and vinylchloride may be explosible. Tests were undertaken to study the explosibility of PVC powder suspensions in an atmosphere of air and methane, below the lower explosible limits (LEL) of the methane. Methane was used in place of vinylchloride as a toxicologically safe substitute. It is concluded that methane exercises a strong influence on PVC powder suspensions, causing the minimum explosible concentration to be lowered. (Author)

1102. Durbetaki P [Georgia Inst Technol, Atlanta, GA, School Mech Eng, Fire Hazard and Combust Res Labs]
MEASUREMENT AND PREDICTION OF FABRIC IGNITION TIME AND ITS RELATION TO FIRE HAZARD
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 88-98

Sponsor: Alena Enterprises of Canada

The fire hazard of a system (fabrics, furniture, interior decorations, building materials) is quantified by the probability with which use of a system leads to fire loss. This fire loss probability is a function of subprobabilities with which events occur that lead to a specified loss from fire. The ignition process is the first event of the physico-chemical processes that lead to accidental destruction by fire. The associated probability depends on the ratio of exposure time over mean ignition time. Mean ignition time characterizes the material and, therefore, contributes significantly to the material fire hazard description. Experimental and analytical research is being carried out in the Fire Hazard and Combustion Research Laboratories of the School of Mechanical Engineering at Georgia Institute of Technology to measure and predict fabric ignition time as a function of material properties and heating intensities. Ignition probability measurements were performed on selected single fabrics exposed to radiative and gas flame heating. 4 figs, 5 tables, 15 refs. (Author)

d. NATURE OF COMBUSTION PRODUCTS

1103. Quinn EJ and Dieck RL [Armstrong Cork Co, Lancaster, PA, Res and Dev Center]
FLAME AND SMOKE PROPERTIES OF THE POLYPHOSPHAZENES. PART 3. POLYARYLOXYPHOSPHAZENE COPOLYMER FOAMS
J Cell Plast; 13(2):96-101, 1977

Novel, flexible, closed cell foams have been prepared using polyaryloxyphosphazene copolymers. These materials have been expanded in the presence of fillers by means of chemical blowing agents and peroxide curatives. Filler content, based on alumina trihydrate studies, can be varied over a wide range from 50 to 175 parts per 100

parts by weight of the phosphazene copolymer. Foam strength properties were measured and a tensile strength of 50 psi was found at 90% elongation. These polymeric foams were fire retardant with oxygen index values ranging from 32.2 to 38.7. They evolved only small amounts of smoke as measured in the NBS Smoke Density Chamber. D_m values (flaming mode) ranged from 33 to 67. Thus, these particular cellular plastic materials appear to have a propensity for meeting or surpassing the stringent flame and smoke regulations used by most regulatory agencies without sacrificing processability, and desirable foam properties. 4 tables, 19 refs. (Author)

1104. Sumi K and Tsuchiya Y [Res Council Canada, Ontario, Canada]
EVALUATING TOXICITY OF DECOMPOSITION PRODUCTS FROM ANALYTICAL DATA
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 241-248

Sponsor: Alena Enterprises of Canada

Some studies conducted by the National Research Council's (Canada) Fire Research Section toward a better understanding of fire toxicity have been described. The work to date has been confined to analysis of decomposition products followed by assessment of experimental data using a mathematical approach. Bio-assay experiments have not been undertaken. The fire toxicity concept indicates: a) the relative significance of toxic components in the decomposition products and b) the relative propensity of materials to release toxic products. The information obtained by the assessment of toxicity from analytical data complements that from other sources and contributes to a better understanding of combustion toxicology. 1 fig, 2 tables, 16 refs. (Author)

1105. Zinn BT [Georgia Inst Technol, Atlanta, GA, School Aerospace Eng]
ANALYSIS OF SMOKE PRODUCED DURING THE THERMAL DEGRADATION OF PVC AND URETHANE FOAMS

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 55

Sponsor: Alena Enterprises of Canada

This paper describes results obtained in a program investigating the physical and chemical properties of particulates generated during the burning of commonly used building materials. Small samples of rigid urethane foam and polyvinyl chloride plastic have been burned under nonflaming conditions at room temperature in a ventilated combustion products test chamber. Continuous measurements have been made of smoke particle average size, particle size distributions, particulate mass concentrations, and particulate index of refraction utilizing an aerosol sampling system and an *in situ* optical system. This data shows that average smoke particle sizes tend to vary during a test. Furthermore, particle sizes are generally larger for tests run at the highest heating rates. Available data also indicates that the physical characteristics of the smoke particles are relatively independent of atmospheric composition for nonflaming conditions. These results are consistent with previously reported aerosol sampling data. This paper also describes results obtained in a preliminary

3. BEHAVIOR AND PROPERTIES OF MATERIALS

d. Nature of Combustion Products—Continued

chemical analysis of collected PVC particulate matter. (Abstract only.) (Author)

e. PROTECTION AND MODIFICATION OF MATERIALS

1106. Barker RH [Clemson Univ]
FLAMMABILITY OF COTTON/POLYESTER BLEND FABRICS; Paper No. 1.6
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 204-242
Sponsor: Univ San Francisco, Fire Safety Center

Research directed at determining the flammability of cotton/polyester blends, the theory of flame-retardant action, and flame retardant treatments for polyester/cotton blends are reviewed. 9 figs, 2 tables, 30 refs.

1107. Hardin I, Treece AJ, Zeronian SH, Galbraith RL and Farthing BR [US Dept Agriculture, Southern Agricult Experim Stn]
THE EFFECT OF FLAME-RETARDANT FINISHES ON THE SOILING AND SOIL REMOVAL CHARACTERISTICS OF COTTON AND COTTON-POLYESTER BLEND FABRICS; Paper No. 1.4
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 143-197
Sponsor: Univ San Francisco, Fire Safety Center

An effort was made in the study described in this paper to evaluate the effect of four different flame-retardant finishes on the soiling and soil removal properties of an all-cotton and an 80/20 cotton-polyester blend fabric. Two types of soil were used, a particulate and an oil-bound particulate. The effects of varying water hardness and detergent type were a part of the analysis of soil removal behavior. In addition to the soil removal study the effects of the soils on the flammability of the fabrics were examined by the vertical test and oxygen index methods. The effect of the soil and its subsequent removal on the thermal decomposition of the fabrics was determined by differential thermal analysis (DTA) and thermogravimetric analysis (TGA). The effects of the soiling and removal on the fabric surface were studied by scanning electron microscopy. 14 figs, 14 tables, 35 refs.

1108. Meedles HL [Univ California, Davis, CA, Div Textiles and Clothing]
NOVEL APPROACHES TO FLAME RETARDANT FINISHING; Paper No. 1.5
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 198-203
Sponsor: Univ San Francisco, Fire Safety Center

Flame retardant finishing often leads to loss of or reduction of other properties inherent to the textile substrate and to reduced wear life for the garments made from the treated fabric. Recent research has been concerned with novel approaches to flame-retardant finishing of textiles which may lead to adequate flame-retardant properties without loss of other properties which are inherent to the textile, including aesthetic properties, and which may be of potential use by the industry. In this paper some of the approaches that have been used involving chain growth polymerization techniques are outlined, viz. photo- and electron-beam-induced grafting of flame-retar-

dant monomers to selected textile substrates. 2 tables, 5 refs.

1109. Hilado CJ and Cumming HJ [Univ San Francisco, CA, Fire Safety Center]
FIRE RETARDANTS, TOXICITY, AND FLASH FIRE PROPENSITY
J Fire Retard Chem; 4(4):259-261, 1977

Recent data on toxicity and flash fire propensity of materials indicate that the incorporation of fire retardants into various materials for the purpose of retarding ignition and flame spread either has no significant effect on or reduces toxicity and flash fire propensity under specific test conditions. 2 refs. (Author)

1110. Strauss R, Giller A, Zacharowski D and Wiener H
FIRE-RETARDANT COATING; COMPOSITION COMPRISING ETHERIFIED AND NON-ETHERIFIED AMINO-FORMALDEHYDE RESIN
US Patent No. 4,013,599; Cl 260/17.3, (C08I 3/02), Appl 5 Jul 1975, Discl. 22 Mar 1977, Priority: FRG, Appl No 2315416, 28 Mar 1973, Assignee: Hoechst AG, Frankfurt, FRG

Disclosed is an aqueous fire-retardant composition capable of forming a foam layer and consisting of: 1) an aqueous preparation comprising a) a nonetherified amino-formaldehyde resin or its components or a mixture thereof; b) at least one ammonium phosphate; c) a skeleton forming component; and 2) a solution of at least one further amino-formaldehyde resin being at least partially etherified with at least one alcohol having 1 to 12 C-atoms and dissolved in an organic solvent, a construction supporting unit and an electrical cable unit with a coating of said composition. 13 claims, no drawing figs. (Author)

1111. Juneja SC and Richardson LR
SOAK TREATMENTS FOR FIRE RETARDANCE. Eastern Forest Products Lab, Ottawa, Canada; OPX-185 E, 1977

A simple, inexpensive, nonpressure method of treating western red cedar shingles and Douglas-fir plywood to a moderate level of fire retardancy for interior use is demonstrated. The method, a soak treatment utilizing a water-based resin system with a wide application latitude, achieved a level of fire retardancy sufficient for a Class II flame spread rating. Retention period, solution concentration, and use of stickers were evaluated. (Author)

1112. Vaughan TW and Elzold R
DEVELOPMENT OF FIRE-RESISTANT WOOD STRUCTURAL PANELS. FINAL REPORT. Elmendorf Res, Inc, Palo Alto, CA; NASA CR-152019, 42 pages, Jul 1977
Availability: NTIS

Structural panels made with Xylok 210 resin as the binder had a burn-through resistance at least equal to the structural panels made with Kerimid 500. Therefore, because of its comparative ease of handling, Xylok 210 was selected as the resin binder to provide the baseline panel for the study of a means of improving the flame-spread resistance of the structural panels. The final resin-filler system consisted of Xylok 210 binder with the addition of ammonium oxalate and ammonium phosphate to

3. BEHAVIOR AND PROPERTIES OF MATERIALS

e. Protection and Modification of Materials—Continued

the strands of the surface layers, using 24% of each salt based upon the air-dry weight of the strands. This system resulted in a panel with a flame-spread code of about 60, a Class 2 classification. A standard phenolic based structural panel had a flame-spread greater than 200 for laboratory prepared panels. The burn-through tests indicated an average burn-through time of 588 seconds for the specimens made with the final system. This compares to an average burn-through time of 287 seconds for the standard phenolic base structural specimen. One full-size panel was made with the final system. (Author)

1113. Gagliani J, Sorathia UAK and Wilcoxson AL
DEVELOPMENT OF FIRE-RESISTANT, LOW SMOKE GENERATING, THERMALLY STABLE END ITEMS FOR AIRCRAFT AND SPACECRAFT. FINAL REPORT. Solar Turbines Internat, San Diego, CA; NASA CR-151472, S06-4501-7, 139 pages, Jun 1977
Availability: NTIS

Materials were developed to improve aircraft interior materials by modifying existing polymer structures, refining the process parameters, and by using mechanical configurations designed to overcome specific deficiencies. The optimization, selection, and fabrication of five fire-resistant, low smoke emitting open cell foams are described for five different types of aircraft cabin structures. These include: resilient foams, laminate floor and wall paneling, thermal/acoustical insulation, molded shapes, and coated fabrics. All five have been produced from essentially the same polyimide precursor and have resulted in significant benefits from transfer of technology between the various tasks. (Author)

1114. Owens EC and Wright BR
ENGINE PERFORMANCE AND FIRE-SAFETY CHARACTERISTICS OF WATER-CONTAINING DIESEL FUELS. INTERIM REPORT, JAN-AUG 1976. Southwest Res Inst, Army Fuels and Lubricants Res Lab, San Antonio, TX; AFLRL-83, 23 pages, Dec 1976
Availability: NTIS AD-A036 011/5GA

Recent flammability evaluations conducted at US Army Fuels and Lubricants Research Laboratory (AFLRL) have shown that water-containing diesel fuels are more fire resistant (even at temperatures above the flash point) than the same fuel without the water added. These findings led to this project to evaluate the compatibility of such fuels with a full scale diesel engine. Blends of base diesel fuel plus 2% emulsifying agent plus as much as 10% water were evaluated in an unmodified LDT-465-1C, a multifuel diesel engine with wide field usage. No significant changes were observed in power output when operating the engine at equal base fuel flow rates. The smoke-reduction effects were inconclusive, but the nonvisible emissions were substantially altered. Oxides of nitrogen emissions were decreased as much as 30% but were accompanied by a 250% increase in unburned hydrocarbons. The conclusion followed that potential fire-safety benefits and a lack of major detrimental effects in the engine make these water/fuel blends attractive candidates for fire-resistant combat fuels. (Author)

1115. Bauer RG, Kavchok RW and O'Connor JM [*The Goodyear Tire and Rubber Co, Akron, OH, Res Div*]
FIRE RETARDANT EMULSION POLYMERS
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 1-10

Sponsor: Alena Enterprises of Canada

In the past few years the production of flame-retardant rubber products has become increasingly important. Two basic methods have been used by the industry to produce rubber goods that have flame-retardant properties. The first and most widely employed method has been to add flame-retardant compounding ingredients to a conventional general-purpose elastomer. The second method used to produce flame-retardant rubber products is to utilize a polymer that has inherent flame-retardant properties. This second method offers advantages over the use of additives, because one may obtain flame retardancy without a loss in physical properties. Furthermore, a flame-retardant polymer in combination with flame-retardant additives will yield a more flame-resistant end-product. This study describes efforts to obtain high-quality fire-retardant elastomers by the latter method. Principally, copolymers of 1,3-butadiene and various halogen- and/or phosphorus-bearing monomers were explored. These elastomers were found to have physical properties much like commercial SBR, except that they have the added advantage of possessing inherent fire-retardant character. 1 fig, 7 tables, 8 refs. (Author)

1116. Brueggemann WH and DeFranco PJ [*Ferro Corp, Independence, OH*]
DEVELOPMENT OF LOW SMOKE AND FLAME MATERIALS FOR NOISE CONTROL APPLICATIONS
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 149-159

Sponsor: Alena Enterprises of Canada

Control of noise has become a primary concern in our environment. This concern is derived from our greater understanding of the physiological and psychological effects of noise on the human body. In addition to these factors, materials used to control noise must also meet strict requirements concerning surface combustibility and smoke generation as specified by building codes. The development of three materials for noise control which are acceptable under building code requirements are described. These are discussed under their performance as damper, barrier, and absorber noise materials. These materials are being evaluated by the building industry in the United States. 11 figs, 1 table, 5 refs. (Author)

1117. Handa T, Nagashima T and Takeda H [*Science Univ Tokyo, Japan, Dept Chemistry*]
OXYGEN INDEX AND OTHER PARAMETERS FOR EVALUATION OF THE EFFECTS OF FIRE RETARDANTS
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 44-54

Sponsor: Alena Enterprises of Canada

The aim of the research presented in this paper was to develop a small furnace test method for evaluating

3. BEHAVIOR AND PROPERTIES OF MATERIALS

e. Protection and Modification of Materials—Continued

the effect of fire retardants in retarding combustion, to find a good parameter relating to the mode of halogen release from the system which would reflect intrinsically the performance of fire-retardant molecules supported by the action of the synergist (in this case Sb_2O_3) to find a correlation between this explicit parameter for halogen release and other basic parameters individually reflecting the combustion mode and hence implicitly representing the effect of the fire retardant in the small furnace test and to clarify the chemical meaning of the oxygen index as a criterion of oxygen supply to continue the self-combustion in face of HBr release for self-extinction. 7 figs, 4 refs. (Author)

1118. Laszkiewicz B [Politechnika Lodzka, Lodz, Poland], Dutkiewicz J and Bhatnagar VM
SOME ASPECTS OF FLAME-RETARDANT POLYESTER FIBRES

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 56-63

Sponsor: Alena Enterprises of Canada

Considered in this paper are flame-retarding polyester fibers with decabromodiphenyl by the trade name of Flammax B10. The aim of the research was to evaluate the spinning properties of poly(ethylene terephthalate) (PE7) compounded with Flammax B10 and the effect of the flame retardant on the chemical, thermal and flammability properties of PE7 fibers. 8 figs, 3 tables.

1119. Mischutin V [White Chem Corp, Bayonne, NJ]
ROLE OF POLYBROMINATED CYCLIC COMPOUNDS AS FLAME RETARDANTS FOR TEXTILES

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 130-140

Sponsor: Alena Enterprises of Canada

The use of decabromodiphenyl oxide as a flame retardant for textiles is discussed. This material can be employed with pigmentary or colloidal grades of antimony oxide or phosphorous as synergists using an acrylic latex binder to attach it to the fibers. Various routes of application of the product, which include padding, backcoating and backprinting, were explored and the advantages and disadvantages of each application technique are discussed. Finally, the use of decabromodiphenyl oxide with antimony oxide as replacement of tris dibromopropyl phosphate is described. 6 figs, 4 tables, 14 refs.

1120. Slysh R [AMP Inc, Harrisburg, PA]
FLAME-RETARDANT COATINGS FOR PLASTICS

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 201

Sponsor: Alena Enterprises of Canada

The purpose of this work was to determine if intumescent coatings can be used to impart flame-retardant properties to plastics. Three UL-approved intumescent coatings were applied to various plastic surfaces, and their flammability and smoke evolution were measured using modified Monsanto 2-foot tunnel and the UL-94 Vertical Flammability Test. It was found that intumescent coatings are very effective in reducing the flame spread, smoke

generation, and weight loss of many plastics below the level currently obtained with most VE-O rated materials. The application of these coatings to flammable plastics will impart VE-O rating when tested according to the UL-94 procedure. Intumescent coatings are particularly suitable for reducing smoke evolution of plastic materials, which appears to be responsible for many fatalities occurring during a fire. (Abstract only)

1121. Wren HK
A NEW INNOVATION IN FIRE DETERRENT POLYMERS

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada
Sponsor: Alena Enterprises of Canada

This new polymeric innovation is a polyester composition in which part of the acidic component is boric acid. Boric acid has long been known as a fire deterrent, but it is not commonly used in resins. The base polymer molecule is further reacted with an insoluble carbohydrate as the carbonific and a nitrogenous spumific agent to build intumescence into the base molecule, along with anti-smoke properties. These materials become an integral part of the molecule and won't leach out or separate. This base polymer is either reacted with or diluted with solvent or monomer, as the application warrants. This dilution adds to its utility. This polymer is in liquid form and can be blended with the base polymers of many other systems to form adhesives, castings, coatings, fibers and foams that won't burn, smoke, or produce harmful or toxic fumes. These polymers can comprise clothing, furniture, insulation, fabrics, paints, plywood products, varnishes to help save lives and property. 9 refs. (Author)

1. STABILITY OF MATERIALS AT ELEVATED TEMPERATURES

1122. Klingsch W
REINFORCED CONCRETE UNDER TRANSIENT HIGH-TEMPERATURE CONDITIONS — MATERIAL BEHAVIOR AND NUMERICAL TREATMENT

Mechanical Behavior of Materials Conf, Internat, 2nd, Proc, Vol 2 (published in 1978); 1976, August, Boston, MA
Sponsor: Federation of Materials Societies and Internat Conf on Mech Behavior of Materials (ICM)

The decreasing strength, increasing deformation, and decreasing thermal diffusivity with increasing temperature, the numerical treatment of stress effects of fire and heat, curves and values of the effect of high temperatures in concrete frames and building components, and the effects of heat on the endurance characteristics of materials are presented. 5 pages, 6 figs, 4 refs. (Fachdok 13/0850)

1123. Schneider U
STRENGTH AND DEFORMATION BEHAVIOR OF CONCRETE EXPOSED TO STEADY AND UNSTEADY TEMPERATURE STRESS

Bautechnik; 54(4):123-132, 1977 (German)

The results of recent high-temperature tests with relatively large concrete test specimens are described. The aim of the investigation was to determine the strength, elasticity, and deformation properties (creep) of structural concretes up to 450°C. Creep under variable temperatures

3. BEHAVIOR AND PROPERTIES OF MATERIALS

f. Stability of Materials at Elevated Temperatures—Continued

was also studied. The measured creep values were compared with values determined at constant temperatures. The tests show that the values of transient creep and of long-term creep are zonewise of the same order of magnitude. The long-term creep values agree relatively well with values obtained from the literature. But with increasing temperature the scatter of the measured values increases, and deviations of over 100% are noticeable. 14 figs, 26 refs. (Fachdok 13/0840)

4. FIRE MODELING AND TESTING

a. FIELD EVALUATION

b. FIRE BEHAVIOR

1124. Wiersma SJ, Alger RS, McKee RG and Johnson WH

DESIGN OF A CASCADE FIRE APPARATUS FOR TESTING COUNTERMEASURE EFFECTIVENESS. DOD Ground Fire Suppression and Rescue Office, Wright-Patterson AFB, OH; DOD AGFSRS-76-7, 49 pages, Jun 1976
Availability: NTIS AD-A043 176/7GA

A cascade fire apparatus was designed to be used in the evaluation of agent effectiveness and application techniques in suppressing accidental aircraft ground fires involving fuels which are cascading, spraying, or pouring. The apparatus provides for 1) a controllable burning rate; 2) a reproducible fire; 3) a flame geometry that minimizes wind effects; and 4) an adjustable size by virtue of its modular nature. One of the two fuel supply nozzling options yields a smokeless fire; however, the other option has better fire characteristics for evaluating some of the countermeasures. Suppression tests were conducted using PKP and Monnex dry chemical agents and gaseous Halon 1211. It was not possible to compare the effectiveness of Halon 1211 and the powder agents because of the different application rates and capacities of the extinguishers tested and, therefore, the different required fire size. The apparatus appeared to be well suited for evaluation of agent effectiveness against the kinematic fires and also for training firemen in fighting these fires. (Author)

c. FIRE TESTING OF COMPONENTS AND STRUCTURES

1125. Kloeker W, Niesel H, Prager FH, Schiffer HW, Boldenkamp O and Klingelhofer HG [*Bayer AG, Werk Uerdingen, FRG*]

FIRE PROTECTION TESTING AND EVALUATION OF FACADES MADE OF LIGHT-WEIGHT RIGID FOAMED UNSATURATED POLYESTER RESIN CONCRETE
Kunstst; 67(8):438-441, 1977 (German)

Semi-real fire tests of facades made of lightweight rigid foamed unsaturated polyester resin concrete have shown that the fire-chamber test used to test fire resistance does not fully correspond to conditions on a facade. In individual cases the use of normally flammable building materials can be warranted without incurring too great a fire risk. The behavior must be investigated in a near-real fire test on a 1-to-1 scale with original components. 9 figs.

1126. Whitaker P [*Underwriters Labs, Inc*]

POLICY ISSUES ASSOCIATED WITH TESTING AND IMPROVING BUILDING MATERIALS AND FURNISHINGS

Lab Data; 8(4):6-11, 1977

Testing of materials, assemblies, and systems under repeatable and controlled conditions is a way of determining that such items, when used in a prescribed manner, meet designated criteria stipulated in various fire safety codes. It is the view of the Underwriters Laboratories (UL) that fire tests should, to the highest practical degree, relate to the actual fire condition that the test is purported to simulate. A significant amount of useful information can be secured by modeling and extrapolating from existing data. But probably the most useful technique in the evaluation of fire performance of building materials and assemblies is the feedback of field performance under actual fire conditions. Fire testing of materials, assemblies, systems and components such as floors, walls, and columns has contributed significantly to the reduction of fire losses. The development of construction material testing protocols and the problems involved in permitting the laboratory's mark of certification upon a product, and the liability connected with this procedure, are discussed. (This paper was presented at the Third Annual Conference of the National Fire Prevention and Control Administration, which was held in St Louis, MO, on October 24-28, 1977.) 8 photos.

1127. Waterman TE

FIREBALL TESTS OF OPEN WEB STEEL JOISTS. IIT Res Inst, Eng Res Div, Chicago, IL; IITRI Proj J6397, 27 pages, 22 figs, 1 table, May 1977

Based on the tests presented in this report, the use of a spray-on fireproofing insulation appears to be the best coating to protect joists in GSA (General Services Administration) Records Centers from fire temperatures reached prior to sprinkler operation. Coating thicknesses required are near the minimum compatible with commercial application techniques. Since these coatings could significantly reduce heat losses if applied to the entire ceiling, GSA might wish to consider this combined benefit by total ceiling and support coverage. It is probable that coatings with greater insulative quality and lesser fire resistance would also offer the fire resistance necessary for this purpose, while offering further energy savings. (Author)

1128. Breese JN

TESTS ON INSULATIVE BARRIERS AS A METHOD OF PROTECTING NEOPRENE CORE MATTRESSES. Nat Bureau Standards, Inst Appl Technol, Center for Fire Res, Washington, DC; NBSIR 77-1295, 24 pages, 12 figs, 5 tables, 3 refs, Nov 1977
Availability: NTIS

Tests were performed to determine the value of non-combustible insulative barriers as a method of protecting neoprene (chloroprene) mattress cores from igniting and contributing to a shipboard fire. The mattress systems were tested in the heat release rate calorimeter and in a quarter scale model compartment. Thicknesses of up to 44 mm (1-3/4 in.) of ceramic fiber and glass fiber insulation were used to protect the cores. Although the

4. FIRE MODELING AND TESTING

c. Fire Testing of Components and Structures—Continued

insulation reduced the rate of heating of the core, it also served to raise interior temperatures by the effect of heat "trapping" to a point where the core could continue to decompose and smolder after all exterior heat supply had been removed. (Author)

1129. Soroka W and Perlus T [Ontario Res Found, Mississauga, Canada]
EXPERIMENTS WITH SMALL SCALE FIRE TUNNELS
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 181-195
 Sponsor: Alena Enterprises of Canada

The effectiveness of nonpressure fire-retardant treatments of plywood products was evaluated using a small tunnel test. The tunnel is composed of an ion specimen frame mounted 30° to the horizontal with specimen placed in the flame above a burner impinging on the lower end of the specimen. Progress of the flame up the specimen is observed through a graduated window running along the specimen bed. The flame length is recorded at regular time periods. The data obtained from these tests present three different flaming patterns, according to which materials are ranked by flame spread hazard. The effect of test conditions in altering the ranking of materials is discussed. The difficulty of relating small and large tunnels is pointed out, but in most instances good rough estimates can be obtained by fine tuning the operating parameters of a test tunnel. 11 figs, 1 table.

d. FIRE TESTING OF MATERIALS

1130. Anolick C [EI du Pont de Nemours and Co, Elastomer Chemicals Dept, Wilmington, DE], Stewart CW, Perkins LR, Galloway JR and Hellyer W
FLAMMABILITY CHARACTERISTICS OF HEALTHCARE MATTRESSES
EI du Pont de Nemours and Co; 20 pages, 1977

The tests described in this paper were designed to show in a realistic way the relative fire, smoke and toxic gas hazard potential of various types of mattresses now being used or offered for use in hospitals and other health care facilities. The tests were intended to give those who have the responsibility for selecting interior furnishings an opportunity to judge the reaction of various types of mattress constructions to combustion, and to provide a basis in which to develop a set of acceptable performance criteria. The mattresses tested contained polyurethane foam, flame-retardant cotton, and polyurethane foam core with VONAR (a specially formulated cellular elastomer, carboxylated polychloroprene latex) interliners, the latter being a new material developed to reduce the likelihood of ignition of cushioning materials in furnishings. One of the objectives of the study was to evaluate the effectiveness of VONAR in health care mattresses. A description of VONAR, how it works and how it is used, is given in an appendix. 18 figs, 3 tables. (Author)

1131. Condit DA and Cianciolo AD [Olin Corp, Res Center, New Haven, CT]
EVALUATION OF RIGID URETHANE INSULATION FOR RESIDENTIAL APPLICATION BY COMPARTMENT CORNER FIRE TEST; Paper No. 1.8
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 254-277
 Sponsor: Univ San Francisco, Fire Safety Center

A matrix of 11 compartment corner combustibility tests was conducted in the Olin Fire Test Laboratory to evaluate the use of a Class I (ASTM E-84 Flame Spread less than 25) Polyurethane Spray Foam in residential applications. The constructions used were a standard 2 x 4 studded wall backed with 3/4 in. Plyscore. The insulations tested were: 1) none; 2) Class I Polyurethane Spray Foam; 3) fiberglass batting. Three different interior facings were included; 1) nonrated finished plywood paneling; 2) gypsum wallboard; 3) finished plywood paneling over gypsum wallboard. Temperature, photographic and visual observations were recorded. The results of these tests show that the polyurethane spray foam involvement was substantially delayed when protected by gypsum wallboard and did not contribute significantly to temperature development. Fire stops had a beneficial effect in the gypsum faced polyurethane foam test. The data suggests that the polyurethane spray foam applied behind an adequate thermal barrier presents a hazard no greater than fiberglass or no insulation. A single probe type experiment using rated plywood paneling showed a delay in the time to reach maximum temperature when compared to a nonrated plywood paneling. However, maximum temperatures were comparable. 6 figs, 4 tables, 2 refs. (Author)

1132. Gluck DG, Hagan JR and Hipchen DE [Jim Walter Res Corp, St Petersburg, FL]
FIRE PERFORMANCE OF CELLULAR PLASTICS INSULATIONS IN CONSTRUCTION; Paper No. 3.2
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 356-366
 Sponsor: Univ San Francisco, Fire Safety Center

Brief accounts are given of 21 Factory Mutual corner and Jim Walter Research Corp corner and building fire tests in which the cellular plastic insulation or other interior lining material was installed on both the walls and ceiling (or roof), without sprinkler protection. Conclusions from these tests indicate that: 1) insulation in wood frame buildings increased the rate and extent of fire spread within the building; 2) the position of the insulation can have an important effect on the burning characteristics of the building; 3) good correlation seems to exist between the various tests, except for polystyrene foam; and 4) some of the older construction materials exhibit rapid fire spread.

1133. McNeil RR [The Weyerhaeuser Co]
FIRE PERFORMANCE OF HARDWOOD PLYWOOD INTERIOR FINISH; Paper No. 1.7
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 243-253
 Sponsor: Univ San Francisco, Fire Safety Center

The unrealistic results from various tests of interior finish materials are cited, and three important recommendations are advanced for the performance of corner,

4. FIRE MODELING AND TESTING

d. Fire Testing of Materials—Continued

room, or corridor burns: 1) furnishing should be included whenever practical to provide more realistic results; 2) the ignition source should be kept to a size large enough to do the job, but not so large as to overpower the test; and 3) the designer of the test program should consult with responsible suppliers or associations to be sure that the materials and furnishings being tested are representative of what is currently used in the field. 2 figs.

1134. Nadeau HG [*The Upjohn Co, Fire Res Lab, Donald S Gilmore Labs, North Haven, CT*]
EVALUATION OF LARGE SCALE CORNER WALL TEST RESULTS ON EXPOSED AND COATED RIGID URETHANE SPRAY FOAMS AND PRELIMINARY TESTING BY A NEW SMALL CORNER TEST METHOD; Paper No. 3.1

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 325-355

Sponsor: Univ San Francisco, Fire Safety Center

During 1975 two large-scale test programs were carried out to determine fire performance characteristics of both protected and unprotected rigid urethane spray foam. Both high-flame-spread and low-flame-spread urethane spray foam were tested uncoated and protected with two generic cementitious coatings at two thicknesses. One test study was carried out by the Factory Mutual Research Corporation at its West Gloucester, Rhode Island test facilities and involved the FM Large-Scale Corner Wall Test. A series of tests, including some which had been performed earlier on the exposed foam products and one which was supported by an independent company, established the fire performance characteristics of these coated spray foams at the thicknesses of coating employed. A second test study, using the same spray-on rigid foams and cementitious coatings and at identical thicknesses, was conducted at the Underwriters Laboratories, Northbrook, Illinois. This study included a series of ten compartment corner tests, fully instrumented to provide similar data to that obtained at Factory Mutual. In addition to these basic studies, concurrent with each, small-scale tests were conducted to establish further information and possible correlative data. This paper presents the results of both test programs, including the judgments made by Factory Mutual and Underwriters Laboratories. The data are further analyzed with respect to the degree of thermal protection offered by cementitious coatings for protection of property and life. A description and basis for each large-scale test are discussed, and a comparison of both is made. The relationship of small-scale test data to the results obtained from large-scale studies is discussed and evaluated. Finally, a presentation is given on a new Small Scale Corner Test method that can be used for preliminary screening for large-scale corner tests. 9 figs, 9 tables, 13 refs. (Author)

1135. Nelson GL, Bridgman AL [*General Electric Co, Plastics Bus Div, Pittsfield, MA*], O'Connell WJJ and Williams JB

A HARD LOOK AT A FLAMMABLE SUBJECT: MATERIAL PERFORMANCE IN TRANSPORTATION VEHICLE INTERIORS; Paper No. 2.4

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 313-324

Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 175 in *FTA* 2(1/2). 8 figs, 2 tables, 15 refs.

1136. Sal'nikov VK and Isachkin AI
FIRE HAZARD TESTS OF FOAMED PLASTIC COATINGS

Donetsk N-I Ugo'l'n In-t, Tr; (63):226-233, 1976 (Russian)

Title only available. (RZh)

1137. Hilado CJ
SCREENING MATERIALS FOR RELATIVE TOXICITY IN FIRE SITUATIONS

Mod Plast; 54(7):64-66, 68, 1977

Results of screening tests of materials for relative toxicity under specific sets of conditions are presented. Variations in the material, in lab animals, and in the test presently permit identification of major rather than minor differences among materials. Correlation with relative performance in real fire situations is based on a limited number of comparisons. 1 fig, 3 tables, 15 refs. (Author)

1138. Lehe P
TESTING AND EVALUATING THE FIRE BEHAVIOR OF MATERIALS AND COMPOSITES IN RAILCAR CONSTRUCTION

Schiene-fahrzeuge; 21(4):133-137, 1977 (German)

The use of plastics has appreciably increased the quality and comfort of railway cars, but has also increased the fire hazard because of the rapid flame spread over the material, the high temperatures, and the strong smoke generation. The combustibility of plastics is due to the formation and emission of gaseous decomposition products when they are heated and depends on the molecular weight of the polymer, the degree of its crystallinity, and on the filler. In accordance with the UIC-CODEX 564-2 ignition- and combustion-resistant materials can be used for the construction of railroad car bodies. Materials that release toxic gases during burning must be ruled out. It is pointed out that the combustibility classification of materials is not scientifically based and depends on the test method. The colorimetric method is the most accessible, but it is not well suited because of the high potential error and the impossibility of exact classification of thin materials. The Fire Protection Subcommittee of IMCO is working on a unification and refinement of test methods for the classification of materials as combustible and incombustible, combustible being subdivided into materials with fast and slow flame spread. A new combustibility determination is being proposed, as is a new test method, the apparatus for which is being made by the Railway Transportation Research Institute (GDR). A description and sketches of the apparatus for determination of combustibility and flame spread are given. The results of investigations of some materials and of 3-layer composite materials are given. It is pointed out that air in the middle of a 3-layer material accelerates and increases fire spread. The introduction of combustible materials must be avoided. Fire-protection means have their greatest influence only in the initial period of a fire. Plastics based on unsaturated, fiberglass-reinforced polyesters and rigid polyurethanes burn with a strong emission of smoke. Wood contributes less to fire spread than plywood and fiberboards. The introduction of com-

4. FIRE MODELING AND TESTING

d. Fire Testing of Materials—Continued

ponents made of plastics of inorganic, incombustible materials, such as fiberglass, aluminum foil, and others, considerably increase the fire resistance. 6 figs, 2 tables, 13 refs. (RZhf)

1139. Krasny JF and Peacock RD [*Nat Bureau Standards, Washington, DC, Center for Fire Res*]
COMMENTS ON FLAMMABILITY ASSESSMENT OF APPAREL FABRICS
Text Chem Color; 9(4):81-82, 1977

The heat transfer rate from burning fabrics, measured on the Mushroom Apparel Flammability Tester, is compared with flammability assessments reported in a paper by Galil and Lomartire. Agreement between the two methods was found for only a few fabrics. 1 fig, 1 table, 2 refs. (Author)

1140. Babrauskas V
COMBUSTION OF MATTRESSES EXPOSED TO FLAMING IGNITION SOURCES. PART 1. FULL-SCALE TESTS AND HAZARD ANALYSIS. Nat Bureau Standards, Inst Appl Technol, Center for Fire Res, Washington, DC; NBSIR 77-1290, 135 pages, 70 figs, 21 tables, 84 refs, Sep 1977
Availability: NTIS PB-272 064/7GA

A test program was conducted to assess the hazards of institutional mattresses when subjected to a sustained flaming ignition source. This report gives results on full-scale room burns of ten different mattress types under several ventilation conditions. Tenability and rapid flame spread potential criteria were applied in a hazard assessment which showed a wide range of behavior among mattresses now being used in institutions. An extensive review of previous fire tests involving mattresses is included. (Author)

1141. Tatem PA, Marshall PD and Williams FW
MODIFIED SMOLDERING TEST OF URETHANE FOAMS USED IN ANECHOIC CHAMBERS. INTERIM REPORT. Nav Res Lab, Washington, DC; NRL-8093, 16 pages, Mar 1977
Availability: NTIS AD-A038 439/6GA

A program is underway at the Naval Research Laboratory to develop small-scale laboratory fire tests that will predict more accurately the behavior of Class A materials in fires. After development of five small-scale performance specifications for assessing the hazard of carbon-impregnated polyurethane foam, samples of the materials were installed in a large-scale fire test facility to determine the scaling parameters applicable to the foam. The knowledge gained from the large-scale tests under different experimental conditions and with several polyether and polyester foams has been used to scale down to a laboratory test that dynamically measures the expected behavior of the foam in a scaled situation. (Author)

1142. Matonis VA and Bothwell WF [*Monsanto Co, Indian Orchard, MA*]
SMALL SCALE IGNITION TEST FOR PREDICTING REAL FIRE PERFORMANCE OF PLASTIC ARTICLES
Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 179
Sponsor: Alena Enterprises of Canada

A new automated lab scale test that allows the prediction of the ignition behavior of plastic articles in controlled large burn environments has been developed. This test measures the ease of ignition of materials with piloted ignition source, the intensity of which is expressed in terms of heat flux and time of exposure. The test is automated and its results do not depend on the dexterity of the operator. This test is useful for both charring and dripping plastics, with and without fire retardant additives. Further correlations of results with large scale fire performance are underway and will be reported at a later date. This paper described the new apparatus, the test procedures, and the underlying reasons for the selection of each. Typical results were presented and discussed. (Abstract only)

1143. Rains WA [*Smithers Scientific Services, Inc, Akron, OH*]
EVALUATION OF FIRE RESISTANCE COATINGS UNDER ASTM E-119 AND MORE SEVERE TIME-TEMPERATURE EXPOSURE

Fire Retardants: Flammability and Fire Retardants Symp, Internat, Proc; 1976, May 6-7, Toronto, Canada, pages 196-200

Sponsor: Alena Enterprises of Canada

This paper is concerned with a problem common to flammability and fire endurance testing, namely the use of a test designed for one purpose, but then applied to other applications, in this case the use of the ASTM E-119 standard fire test for evaluating fire-resistance coatings used in the oil and chemical industries. A furnace operated under conditions of a very high initial heat input indicated that the test results from a well-designed and carefully controlled propane pit fire could be nearly reproduced. Standard fireproofing materials used by the oil and petrochemical industries have been tested in this facility, details of which are proprietary. Some of the test results are discussed. 1 fig, 5 tables.

e. MODELING AND SCALING

1144. Edwards JC, Perlee HE and Chaiken RF
CYLINDRICAL DUCT FIRE SPREAD. Bureau of Mines; R1-8258, 32 pages, 15 figs, 2 tables, 15 refs, 1977
Availability: NTIS

A two-dimensional, time-dependent, mathematical model has been developed that describes fire spread along the walls of a ventilated duct. The model is based on the assumption that the leading edge of the fire zone propagating along the wall surface coincides with the isotherm for the fuel ignition temperature. The model includes gas-phase energy transport via radiation and forced convection inside the duct and solid-phase energy transport by conduction into the fuel lining. Product gases emitted from the fire zone are assumed to mix uniformly with the ventilation gas to produce an optically dense gas mixture at the combustion temperature that enters the preheat region. Numerical solutions of the model equations for a coal-lined duct (simulated coal mine entrance) have been used to investigate the effects of tube radius, air velocity, combustion temperature, and optical density of the soot-laden gas upon the terminal fire spread rate. (Author)

4. FIRE MODELING AND TESTING

e. Modeling and Scaling—Continued

5. FIRE PROTECTION OF STRUCTURES

a. BUILDING DESIGN AND CONSTRUCTION

1145. Milovanov AF

CALCULATION OF HEAT-RESISTANT REINFORCED CONCRETE BUILDING COMPONENTS [Raschet Zharostoykikh Zhelezobetonnykh Konstruktsiy] Stroyizdat, Moscow, USSR; 1st edit, 232 pages, 1975 (Russian)

The basic principles are given for the design and construction of reinforced concrete components made of ordinary and heat-resistant concrete for industrial buildings and structures, various thermal systems, furnaces, smoke stacks and flues operating under medium- and high-temperature conditions. Information regarding the effect of heating on the physical-mechanical and rheological properties of the concrete and reinforcement that is required in the design of such structures is given. The effect of temperature on the performance of reinforced concrete structures is analyzed for short- and long-term heat. Calculation features are examined for reinforced concrete components under medium- and high-temperature conditions with respect to limit states, design recommendations are advanced, and calculation examples are cited. The book is intended for engineers in research and design organizations. (Author)

1146. Gypsum Assoc

FIRE RESISTANCE, DESIGN MANUAL, 1978 EDITION Gypsum Assoc, Evanston, IL; 1978 edit, 72 pages, Aug, 1977

This manual is intended as a convenient and useful aid to anyone concerned with the performance characteristics of a wide range of gypsum fire resistive and sound control building component designs (wallboards, plasters, laths, blocks, concrete). Design information can be quickly and easily determined. Comparison of these characteristics allows the user of this manual to be more accurate in meeting particular design requirements. It provides data especially useful to architects, building officials, fire service and insurance personnel. Designs in this manual utilize gypsum products to provide fire resistance to walls, partitions, floor-ceilings, columns, beams, and roof decks. They are classified according to their use and fire resistance. (Author)

1147. Veksler VL (Ed) [Central Sci Res Dev Inst for Standard and Experim Des of Housing, USSR]

FIRE RESISTANCE OF RESIDENTIAL BUILDING STRUCTURES [Ognestoykost Konstruktsiy Zhilykh Zdaniy]

Central Sci Tech Inst on Civil Constr and Architecture, Moscow, USSR; 1st edit, 57 pages, 1977 (Russian)

This survey was prepared by the Central Scientific Research and Development Institute for Standard and Experimental Design of Housing. The survey contains analytical material and data on the status of the problem of fire resistance of structures, and on methods of calculating fire resistance developed at the All-Union Fire Protection Research Institute, the leading institute on this problem in the USSR. The contents are as follows: Status of the Problem; Ignition and Spread of Fire in Buildings;

Standardization of Fire Resistance Classes in Apartment Buildings; Standardization of Fire Resistance and Combustibility of Structural Components; Fire Resistance Testing of Structural Components; Calculating the Fire Endurance of Structures; Conclusions and Recommendations; and References. (Author)

1148. Parnell AC

ROLE OF BUILDING DESIGN

Fire; 70(Suppl):43, 48, 1977

In approaching fire safety, efforts are made to establish priorities, usually in accordance with the major risk, ie, life safety or property/structural/consequential loss. Even without these broad categories, however, the cost element occurs frequently in value judgments, in the individual sections of these categories, as well as the conflict of various interests. The subjects of safety are examined separately and areas of conflict are identified, namely, life safety, safety of contents and of structure, and fire protection systems (alarms and detection, extinguishment systems, either local or fixed, passive or active), particularly the installation of fixed sprinkler systems are analyzed on a cost/benefit basis. Smoke control systems are examined separately as well, in addition to other protection methods. (This paper was presented at the September 30, 1977, meeting of the Fire Protection Association (UK) at Brighton.)

1149. Ingelbrecht DML [John Laing Res and Dev Ltd, UK]

ROOFS AND FIRE-DESIGNER'S VIEWPOINT

Fire Prev; (121):25-29, 1977

The design aim is to arrive at the desired balance of performance of a number of functions, including weatherproofing, structural stability, thermal insulation, fire behavior, and, in some cases, noise insulation. The consequences of failure of performance of the different functional aspects are variable. On the one hand, the test for adequate performance, say for weatherproofness, will be inevitable: the consequences of failure may be irritating or perhaps extremely costly. On the other hand, the real test for performance in fire may never be called for, yet the consequences of failure could be disastrous. This outline of design considerations of roof functions and performances shows how fire safety requirements fit into the overall design picture. (This article is based on a paper presented at the Fire Technology Forum on Roofs and Fire in May, 1977.) 1 fig, 4 photos.

1150. Levin A

CAUTION WITH COOLING TOWERS

Pozhar Delo; (5):28, 1977 (Russian)

The not infrequent cases of cooling-tower fires during construction are pointed out. In analyzing two such fires it was found that cooling-tower fires are characterized by a high rate of flame spread, reaching 2 m/min. It is recommended that preventive inspection be increased and that during the construction period a temporary water line be constructed to wet the fire-hazardous portions of wooden structures at a rate of 0.1 l/sec per running meter. (RZH)

5. FIRE PROTECTION OF STRUCTURES

a. Building Design and Construction—Continued

1151. Diggs RE

METAL BUILDING WITH COMBINED TEMPERATURE CONTROL AND FIREFIGHTING SYSTEM

US Patent No. 4,019,581; CI 169/16, (A62C 37/14), Appl 18 Dec 1975, Discl. 26 Apr 1977

A patent is disclosed for a metal building with combined temperature control and firefighting system, wherein the building includes a metal frame structure having hollow members defining water flow passages for circulation of water throughout the building structure to heat or cool the building, depending upon whether hot or cold water is circulated, and having heat responsive devices and water distribution devices connected therewith, whereby in the event of a fire, water is caused to flow over portions of the building surface and through the frame members, to prevent damage or destruction thereto due to heat from the fire. 7 claims, 16 drawing figs. (Author)

b. DETECTION AND ALARM

1152. Wagner JP [Gillette Res Inst, Rockville, MD]

SMOKE DETECTOR CHARACTERISTICS; Paper No. 6.4 *Fire Safety Conf, Internat, Second, Proc*; 1977, Jan 24-28, San Francisco, CA, pages 432-458

Sponsor: Univ San Francisco, Fire Safety Center

The primary purpose of this paper is to present selected performance characteristics for several generic types of smoke detectors classified as ionization, photoelectric, and Taguchi gas sensor, with a view toward the residential fire problem based on a detailed study carried out for the US Bureau of Mines. The operational characteristics of these sensors and known problem areas are considered in some depth. A cursory treatment is given to the characteristics that improved smoke detectors should have. 9 figs, 5 tables, 16 refs. (Author)

1153. Duch CK

FIRE DETECTION

ASELF; (59):49, 51, 53, 55, 61, 63, 65, 67, 1976 (Spanish)

Automatic fire detection systems include elements sensitive to fire factors and a central station which receives information on the status of the electrical circuitry and signals indicating actuation of the fire detectors. The station can also perform additional functions, such as triggering fixed fire extinguishing systems, stopping ventilation and air-conditioning systems, and closing fire doors and smoke screens. Fire detectors are classified by type (optical, ionization, thermal, etc), as well as by the nature of the response to a changing parameter (maximum or differential effects). The geometric and technological characteristics of the protected premises have an important influence on the choice of the required detector. For instance, flame detectors are recommended for enclosures greater than 20 m in height. But if the enclosure has open flame sources (welders, furnaces, etc), rate-of-rise detectors are recommended. But they are not effective in enclosures higher than 7.5 m. It is also pointed out that thermal maximum-effect detectors are not effective when the ceiling is higher than 4 m. Fire detection systems may be of the integral type (that is, protecting an entire area, ventilation ducts, etc), ensuring protection over sectors of premises, and of the selective type, ie, protecting individual items. They must be designed and constructed

in accordance with existing standards for low-voltage installations. 4 figs. (RZh)

1154. Litton CD [Bureau of Mines, Pittsburgh Mining and Safety Res Center]

A MATHEMATICAL MODEL FOR IONIZATION-TYPE SMOKE DETECTORS AND THE REDUCED SOURCE APPROXIMATION*Fire Technol*; 13(4):266-281, 1977

Numerical solutions to the differential equations characterizing the performance of ionization-type smoke detectors are presented for a monodisperse system of smoke particles for which multiple charging may be neglected. It is further assumed that the dominant transport mechanism for smoke particles is due to natural convection. Of perhaps greater importance is the derivation of an approximation for the current loss in the presence of smoke particles. The resulting expression relates the current loss to the smoke density, the average smoke particle size, the ionization chamber geometry, and the ratio of operating current to saturation current. 8 figs, 11 refs. (NFPA)

1155. Kiyomiju M, Kimura M and Ishikawa Y
DEVELOPMENT OF AUTOMATIC FIRE WARNING SYSTEM EQUIPMENT FOR RESIDENTIAL AND OFFICE BUILDINGS*Kuki Tyowa to Reito*; 17(1):125-133, 1977 (Japanese)

An analysis is made of some problematical aspects of the development and operation of automated (in varying degrees) fire safety systems equipment, in particular fire detection and alarm systems designed for installation in multi-story urban residential and office buildings. The most important aspects of the development and operation of such equipment are the choice of fire detector type and the spatial distribution of the detectors in the premises being protected. Comparative characteristics are given, as is a description of the design and operating principle of seven basic types of detectors responding to an increase in temperature: those with a sensor using a bimetallic junction; two materials with different linear expansion coefficients; materials with electrical conductivity dependent on the ambient temperature; with thermocouples; mercury contacts; readily feasible elements; and those operating on the principle of the volumetric expansion of air or some closed-volume filler. The presently effective and recommended standards on the area of the protected premise requiring one detector of each type are cited. A brief comparative evaluation is given of the main types of thermal detectors. Thus, the bimetallic detectors are relatively slow in response and are not very stable, owing to aging of the bimetallic junction, leading to residential deformation and, consequently, to spread of the temperature upon repeated actuation. Detectors fused on the use of two materials with different linear expansion coefficients have a slow response owing to the great mass of the sensitive element. Detectors with mercury contactors are characterized by operational unreliability because of frequent discontinuities in the mercury column, which is the current-conducting element. Detectors based on readily fusible elements have the best operating characteristics, but they are one-shot devices, causing considerable inconvenience, and also do not permit checking the working order of the fire warning system. Detectors based

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

on the principle of volumetric expansion of air are characterized by a highly complex design and low operational reliability. Detectors employing thermocouples can be used only if it is known that the outbreak of a fire will be accompanied by a sharp increase in temperature in the area where they are installed; otherwise, they will not be actuated. Considered separately are the most recent type of thermal fire detectors, those with thermistors. Also considered are the electrical circuit, design and operating principle of ionization detectors, which respond to the appearance of smoke and gaseous combustion products in the protected medium. 20 figs, 6 tables. (RZh)

1156. Keating JP and Loftus EF [Univ Washington, Seattle, WA, Dept Psychol]

VOCAL ALARM SYSTEMS FOR HIGH-RISE BUILDINGS — A CASE STUDY

Mass Emergencies; 2(1):25-34, 1977

Several research areas of psychology provide information that can be applied to questions of human behavior in fire emergencies. Findings from social, cognitive and human engineering psychology suggest types of instructions which should be most effective in eliciting desired responses during emergencies, as well as how people might behave under ambiguous, stressful situations. The present study suggests how such findings, obtained from a test of a public-address alarm system (VAS = Voice Alarm System) in the 37-floor Seattle Federal Building on oriented and nonoriented respondents, can be applied to the development and evaluation of vocal alarm systems in highrise structures. 16 refs.

1157. Sorantin H

RADIATION PROTECTION REQUIREMENTS FOR SMOKE DETECTORS

Oesterr Feuerwehr; 31(4):62, 64-65, 1977 (German)

Ionization detectors are devices which contain radioactive materials in potentially hazardous quantities. Therefore, some legally prescribed guidelines must be maintained in producing, selling, installing, repairing and removing them. The regulations in effect for Austria, especially the testing of the detectors before release and the radiation-protection requirements to be fulfilled before issuance of an operational authorization, are presented. Also discussed are the structure of ionization detectors and the various radionuclides presently in use. 1 table, 7 refs. (Fachdok 13/0794)

1158. Pluchard M

AN INTERESTING PARALLEL: INTRUSION AND FIRE SAFETY

Rev Tech Feu; 18(164):33-34, 1977 (French)

Various aspects of the parallel between intrusion and fire alarm methods are discussed. Nature of fires to be detected, methods and location of signal transmission systems, etc, are analyzed. It is shown that combined intrusion-fire systems can be developed only after a careful analysis of all the features of the premise being protected, otherwise the system will be ineffective. (RZh)

1159. Anon
DETECTION

Rev Tech Feu; 18(164):10-20, 1977 (French)

The primary phenomenon to be detected by a system is fire. Detectors made of various materials responding to various fire signatures such as heat, rate of spread, gas, ionization, and differentials, are reviewed, specifically smoke, photoelectric, diffusion, gas-mixture-response, flame detectors, and others. The installation, immediate environment of the system, the best-suited rooms or areas of the building to be protected, operation, and maintenance of these costly facilities are discussed, as are the experimentally determined most favorable points of installation. The review is concluded with information on alarm centers, their functions, operating mode, design, and supply of all these systems with electrical power. 2 figs. (Fachdok 13/1005)

1160. Thomson P

FIRE: METHODS OF PROTECTING PERSONNEL AND WORK SPACE. PART 1. TYPES OF DETECTORS

Rural Urban Roads; 15(5):36-38, 1977

Following a brief description of the different stages of a fire (incipient, smoldering, flame, and heat), the different types of fire detectors suitable for these situations and particularly useful at certain stages of a fire are reviewed, including fixed-temperature, rate-compensation, and rate-of-rise thermal detectors, flame detectors, photoelectric smoke detectors, "Tyndall effect" photoelectric systems, products-of-combustion ionization systems, single- and dual-chamber and low-voltage ionization detectors.

1161. Thomson P

FIRE: METHODS OF PROTECTING PERSONNEL AND WORK SPACE. PART 2. DETECTOR SELECTION AND ENGINEERING

Rural Urban Roads; 15(6):70-72, 1977

Preliminary steps required in planning for the installation of a detector system are outlined, with particular emphasis on the type of hazard expected in the various locations and the detector type most suitable for monitoring the hazard. Detector spacing should conform to the linear maximum indicated by tests of the Underwriters' Laboratories and Factory Mutual Laboratories for the particular device used, but may be subject to other criteria, such as building layout. The location of smoke detectors should take into account air velocity, diffusion or stratification of smoke, return, supply or circulating blowers, air conditioning facilities, temperature variations, and the like.

1162. Horvath ZJ

OPTOELECTRONIC METHODS AS FIRE DETECTION MEANS

Technica (Switz); 26(5):235-241, 1977 (German)

A report is made on the prevention of fire or, more appropriately, on the detection of situations which combine all the components which, taken together, are capable of triggering a fire. For this reason, the report deals not with a fire which has already broken out and with controlling such a fire, but with the elements which bring it about. A simplified description of the theory of scattering and absorption is followed by a description of several types of detectors based on this theory and their characteristics, particularly scatter-chamber detectors with diode lasers and photodetectors and flame detectors, which are

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

used to detect invisible flames. Also discussed are near-IR sensors. 22 figs, 9 refs.

1163. Cerberus AG (Co)

FIRE DETECTOR

Belgian Patent No. 822,952; Cl G08B, Appl 4 Dec 1974, Discl. 9 Mar 1977, Priority: Switzerland, No. 17.219/73, 7 Dec 1973, Assignee: Cerberus AG, Mannedorf, Switzerland

The invention concerns a fire detector comprising a seat for attachment and a detector, fixedly connected to the seat and containing a detector unit sensitive to phenomena accompanying a fire. The seat is provided with a movable locking assembly which, when a connection has been made between the seat and the detector, engages a slot in the detector in such a way as to prevent the reverse movement necessary to separate the two. This invention makes it possible to prevent interference by unqualified personnel.

1164. Dreamland Electr Appliances

DETECTOR APPARATUS

Belgian Patent No. 824,842; Cl G08B, Appl 28 Jan 1975, Discl. 17 Jun 1977, Priority: FRG, No. 404 0/74, 29 Jan 1974, Assignee: Dreamland Electr Appliances Ltd, UK

The invention concerns an apparatus for detecting a variation in the electrical characteristics of a pickup, distinctive in that it comprises several electrical circuits connected in parallel to an output circuit, each circuit being also connected to a pickup, the output circuit being actuated when the electrical characteristics of the pickup vary, each parallel circuit being provided with means to monitor and indicate correct functioning. This invention is particularly applicable to the detection of fire and overheating conditions.

1165. Lauthier J-C, Mars J-C, Schmitz F, Roussignol J and Sutren G

PROCEDURE FOR MANUFACTURING SEALED IONIZING RADIATION SOURCES AND SOURCES OBTAINED BY THIS PROCEDURE

Belgian Patent No. 823,259; Cl G08B, G21F, Appl 12 Dec 1974, Discl. 9 Mar 1977, Priority: France, No. EN 73 45060, 17 Dec 1973, Assignee: Commissariat a l'Energie Atomique, Paris, France

An invention is disclosed for a method of manufacturing sealed ionizing radiation sources for fire detectors and sources obtained by this method. A thin active layer of a radioelement is deposited on a metal substrate and the coated substrate is subjected to oxidation to obtain an inactive coating consisting of an oxide of the metal.

1166. Hochiki Corp

FIRE DETECTION SYSTEM

French Patent No. 2,318,657; Cl A62C 39/02; G08B 17/10, Appl 23 Jul 1976, Discl. 25 Mar 1977, Priority: Japan, No. 90.057/75, 25 Jul 1975, Assignee: Hochiki Corp, Japan

The present invention concerns a fire detection system which permits discrimination between a fire and some other cause. According to the invention, it comprises a signal-producing fire detector, an oscillator, an AND gate receiving the signal and pulses from the oscillator to produce a detection pulse, a counter to limit the detection

observation time T due to a predetermined number of pulses produced by the oscillator and to produce a zero-reset pulse at the end of this period, a second counting means to repeat the detection pulse count during the time T and to provide a signal after counting a predetermined number of detection pulses, zero reset by the signal of the second counting means after expiration of time T, and a fire warning means controlled by the output signal of the second counter. 1 claim, 9 drawing figs.

1167. Hochiki Corp

OSCILLATOR CIRCUIT

French Patent No. 2,319,246; Cl H03K 3/282; G08B 17/10, Appl 23 Jul 1976, Discl. 18 Feb 1977, Priority: Japan, No. 90.055/75, 25 Jul 1975, Assignee: Hochiki Corp, Japan

The aim of this invention is an oscillator circuit comprising three inverters, series connected in three stages, capable of modifying the length of the pulses it produces. The patent relates in particular to an oscillator circuit designed to energize a smoke detector for the purpose of detecting the presence of fire. 3 claims, 4 drawing figs.

1168. Matsushita Electric Works

LIGHT-DIFFUSION SMOKE DETECTOR

French Patent No. 2,318,417; Cl G01N 15/06; A62C 39/02; G08B 17/10, Appl 13 Jul 1976, Discl. 18 Mar 1977, Priority: Japan, No. 86.793/75, 15 Jul 1975, Assignee: Matsushita Electric Works Ltd, Japan

The invention relates to a light-diffusion smoke detector that is effectively sensitive to both white and black smoke and is applicable for the detection of hydrocarbon fires or other fires releasing white and black smoke. In this detector a wavelength of light λ and an angle of reception of the diffused light, defined by the direction of the incident light and the direction connecting a smoke particle and a light-receiver component, are determined such that the following conditions are satisfied: $\lambda \leq 950$ microns when $\theta \leq 45^\circ$, $\theta \leq -0.18\lambda + 216$ when $45^\circ \leq \theta \leq 135^\circ$ and $\theta \leq 135^\circ$ when $\lambda \leq 450$ microns. 4 claims, 5 drawing figs.

1169. Redfern DL

THERMAL DETECTION DEVICE

French Patent No. 2,321,117; Cl G01K 7/00; G08B 17/06, Appl 11 Aug 1976, Discl. 11 Mar 1977, Priority: Australia, No. PC 2.721/75, 11 Aug 1975, Assignee: Wormald Internat Ltd, Australia

The patent relates to a thermal detection device to signal the onset of abnormal thermal conditions, comprising a housing, means within the housing to react to a change in temperature to produce an analog electrical signal, means for electrical processing of the signal to produce an alarm when the signal exceeds a predetermined value or increases to a level exceeding a predetermined level, distinctive in that the housing exhibits at least one heat-conductive zone, in that a strip of integrated circuits is mounted inside the housing in thermal connection with the conductive zone, the strip of integrated circuits containing a heat-sensitive semiconductor component to produce the analog signal indicating a change in temperature. 7 claims, 3 drawing figs.

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

1170. Siemens AG (Co)

PROCEDURE AND EQUIPMENT FOR THE TRANSMISSION OF MEASURED VARIABLES IN A FIRE ALARM SYSTEM*French Patent No. 2,319,165*; Cl G08B 17/00, Appl 19 Jul 1976, Discl. 25 Mar 1977, Priority: FRG, No. P 25 33 330.6, 25 Jul 1975, Assignee: Siemens AG, FRG

The invention relates to equipment and procedure for the transmission of measured parameters in a fire signalling system, according to which measured parameters determined by the various fire alarm devices, in parallel along the measurement lines, are transmitted in analog fashion to a central processing unit where parameters are combined to obtain differentiated incident or alarm signals. Distinctive of the system is the cyclic interrogation of all the signalling systems of a line, each signalling device being triggered after a characteristic actuation time to furnish a pulse of current, the length of which is proportional to the measured variable. In the central processing unit the location of each signalling device is determined by measuring the delay time and the variable it measured is determined by measuring the amplitude of the pulse. 7 claims, 3 drawing figs.

1171. Siemens AG (Co)

PROCEDURE AND EQUIPMENT FOR THE TRANSMISSION OF COMMANDS IN A FIRE PROTECTION INSTALLATION*French Patent No. 2,319,166*; Cl G08B 17/00; A62C 37/00, Appl 20 Jul 1976, Discl. 25 Mar 1977, Priority: FRG, No. 25 33 354.4, 25 Jul 1975, Assignee: Siemens AG, FRG

A patent is disclosed for equipment and procedure for the transmission of a command in a fire protection system. During one control cycle a single fire protection device in a line is switched into a state of receiving control signals, in a specified time interval; the duration of this potential receiving state is determined by the duration of operation of a time-delay unit. In the control station the instant the time-delay unit is triggered is used as the address (location) of the corresponding protection device, and this opportunity can be used to transmit control signals to the line during the period the corresponding time-delay unit is in operation. 16 claims, 5 drawing figs.

1172. Soc Gamma Electronic

FLAME DETECTION DEVICE*French Patent No. 2,323,410*; Cl A62C 39/00, G08B 17/12, Appl 9 Sep 1975, Discl. 8 Apr 1977, Assignee: Societe Gamma Electronic

A device is disclosed for the detection of flames generated at the onset of a fire, distinctive in that it comprises a photocathode tube sensitive to ultraviolet radiation powered by a d-c converter coupled to a capacitance-resistant circuit which integrates the photocathode power circuit, in that the supply voltage is regulated by a set of transistors, a zener diode and a potentiometric divider, while the current variations from the photocathode while in operation are processed in the form of pulses by a set of two comparators, one functioning as an integrator, the other as a zero reset gate, the pulses being counted every 30 seconds and an alarm being triggered if this number exceeds 6. 9 claims, 2 drawing figs.

1173. Barbier D, Landre J-C, Lauwick B and Poujois R

CIRCUIT FOR THE DETECTION OF ABNORMAL PHENOMENA*FRG Patent No. 2,624,269*; Cl G08B 23/00, Appl 29 May 1976, Discl. 7 Apr 1977, Priority: France, No. 7,517,163, 2 Jun 1975, Assignee: Commissariat a l'Energie Atomique and Compagnie Centrale Sici

For a description of this patent see *FTA* 2(3), Abstract 767 (French Patent No. 2,313,723.)

1174. Bering G

IONIZATION SMOKE DETECTOR*FRG Patent No. 2,546,970*; Cl G08B 17/10, Appl 20 Oct 1975, Discl. 21 Apr 1977, Assignee: Preussag AG Feuerschutz, Bad Oldesloe

An ionization smoke detector is disclosed with an ionization chamber, two different-size main electrodes disposed in the ionization chamber, a measurement electrode, impermeable to radiation and air and with a central aperture disposed between the two main electrodes but closer to the smaller one, and a circuit connected to the measurement electrode which generates an alarm signal at at least one threshold value of the voltage between the measurement and main electrodes, the measurement electrode dividing the ionization chamber into a measurement chamber and an appreciably smaller reference chamber, a radioactive radiation source being disposed on the smaller main electrode separated from the measurement electrode, this source ionizing the reference chamber and the measurement chamber through the aperture of the measurement electrode, the measurement chamber being accessible to the ambient air, and the reference chamber being open to the entrance of ambient air from the measurement chamber side, distinctive in that the reference chamber communicates with the measurement chamber only via the aperture of the measurement electrode and in that this aperture is so dimensioned that 80 to 90% (preferably 90%) of the radiation from the radiation source reaches the measurement chamber. 10 claims, 2 drawing figs.

1175. Enemark RB

SMOKE DETECTOR CIRCUIT*FRG Patent No. 2,600,278*; Cl G01N 21/28, G08B 17/10, Appl 7 Jan 1976, Discl. 14 Apr 1977, Priority: USA, Conv No. 619629, 6 Oct 1975, Assignee: Electro Signal Lab Inc, Rockland, MA, USA

For a description of this patent see US Patent No. 4,025,915, abstracted in this issue of *FTA*.

1176. Esser K

TWO-LINE FIRE DETECTION SYSTEM*FRG Patent No. 2,544,400*; Cl G08B 17/00, Appl 3 Oct 1975, Discl. 7 Apr 1977, Assignee: Klaus Esser KG, Neuss

The patent concerns a fire detection system with at least two detection lines per surveillance area, the lines connecting two fire detectors of the same physical measurement principle, distinctive in that the first detection line is more sensitive than the second one and that the first line, when its response threshold is exceeded, issues a pre-alarm over a private auxiliary fire detection system (telephone line) and the second detection line, when its

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

response threshold is exceeded, issues a full alarm at the alarm center of a local fire station. 5 claims, 4 drawing figs.

1177. Schenk R and Bizer W

APPARATUS FOR REMOTE SUPERVISION OF A NUMBER OF SUBSTATIONS

FRG Patent No. 2,545,653; Cl G08B 25/00, Appl 11 Oct 1975, Discl. 21 Apr 1977, Assignee: Brown, Boveri u. Cie AG, Maunkeim

The invention concerns an apparatus for the remote supervision of a number of substations, distinctive in that a transmitting and a receiving station are disposed at the two ends of a transmission link, that the premises to be supervised are located between these two stations and that their contacts (semiconductor components) lie between the two conductors of the transmission link, and that the contacts are currentless in the rest state. The transmitting station transmits and the receiving station reacts to direct current. Also, the transmitting station transmits alternating current of a known frequency to which the receiving station responds selectively. 4 claims, 1 drawing fig.

1178. Bachmann F, Elias S and Milenz G

INFRARED DETECTOR

GDR Patent No. 123,845; Cl G08B 17/12, G01K 7/116, Appl 18 Feb 1976, Discl. 19 Jan 1977, Assignee: Lothar Schmidt, Ministerium des Innen, Berlin

A patent is disclosed for an infrared detector to detect fires, sparks, and undesired overheating in which the infrared radiation is aimed at a photoelectric cell disposed in the focus of a beam collector or receiver, distinctive in that bridge circuit supplied by a sine generator is provided, two parallel, oppositely directed one-way rectifiers, selectively operatable, being arranged at the input of the bridge circuit, in that the photoelectric cell is series-connected to a temperature-dependent resistor in one arm of the bridge circuit, while an ohmic resistor with controllable pickup is disposed in the other arm such that a unit consisting of a known a-c amplifier, threshold switch and control element is connected at the point of junction of the photoelectric cell and temperature-dependent resistor, as well as at the controllable pickup of the ohmic resistance.

1179. Koda E and Wakasugi S

RECEIVER FOR FIRE ALARM DEVICE

Japanese Patent No. 51-43759; Cl 101 F 2, (G08B 25/00), Appl 25 Sep 1971, Discl. 24 Nov 1976, Assignee: Nittan KK

Proposed are a circuit and operating principle for an automatic device as part of a fire alarm system to periodically monitor the status of the apparatus and to diagnose faults. The device is based on the principle of imitating the outbreak of a fire. For this purpose the system develops control signals having the same characteristics as the weak-current d-c signals which are generated by the fire detectors when a fire breaks out and which are transmitted to the receiver input, where they are processed and, if required, a decision is made automatically as to the outbreak of a fire. Control signals are also applied to the electrical circuit of each detector; in

this case the service receiver is actuated and visual and acoustic warning signals are generated. The control signals are developed and are transmitted to the appropriate fire detector circuits in discrete fashion in a time sequence: first the control signal is applied to the circuit of the first detector, then the second, third, etc. This is accomplished by an electronic commutator that is governed by a special timer and which successively connects the output of the control-signal generator to the appropriate detector circuits. The electronic commutator is rigorously synchronized with the circuit, which verifies the presence of fire warning signals and, if a discontinuity is observed in the circuit of any detector, or if there is some fault in the corresponding channel of the receiver itself, the number of the detector with a fault in its circuit is automatically identified on the digital panel of the receiver self-supervision unit. 1 drawing fig. (RZh)

1180. Sasaki A

IONIZATION SMOKE DETECTOR

Japanese Patent No. 51-47039; Cl 101F 32, (G08B 17/10), Appl 4 Apr 1969, Discl. 13 Dec 1976, Assignee: Nittan KK

A structural diagram, electrical circuit and operating principle for a smoke ionization detector of high reliability is proposed. The detector uses the principle of a decrease in electrical conductivity between electrodes disposed in the zone of action of a radioactive radiation source when smoke appears. The detector consists of two ionization chambers and a field transistor. The chambers are connected in series relative to each other and in parallel relative to the field transistor, one of them being connected parallel to the collector-base section, the other to the base-emitter section of transistor.

As a result, the two chambers form a voltage divider, uniquely defining (at fixed collector voltage) the operating mode of the transistor. The chamber connected to the base-emitter section is readily accessible to the outer air. A wire grid serving as a negative electrode prevents large dust particles from entering the chamber. The other chamber is essentially inaccessible to the outer air. Each chamber contains an identical radioactive element. The air entering the open chamber is continually ionized by alpha rays united by the radioactive element, thus becoming capable of transmitting electrical current. When smoke enters the open chamber, its internal resistance increases owing to a decrease in the number of ion pairs being generated, resulting in an increase in the positive potential on the base of the field transistor. At a certain smoke concentration the magnitude of the current passing through the transistor increases sharply, triggering an alarm. 2 drawing figs. (RZh)

1181. Yamazaki K

FIRE AND THEFT ALARM CONTROL SYSTEM USING VIDEO CAMERAS

Japanese Patent No. 51-43360; Cl 101 F 4, (G08B 13/00), Appl 28 Dec 1970, Discl. 20 Nov 1976, Assignee: Nippon Marantsu Kogyo KK

Proposed are the block diagram and operating principle of a fixed automatic system intended for fire and intrusion detection in protected premises and the triggering of a warning signal. The principal component of the system

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

is a wide-angle TV transmitter. Signals from the camera are passed on to an analog-discrete converter that is rigorously synchronized with the modulating scanning voltages of the TV camera and which converts the TV image signal, orthogonally decomposed into two components, into discrete pulse-code trains. These pulse trains are passed on to the input of the memory unit, which is based on multi-cascade discrete-digital shift registers, each train being delayed in the memory for a period equal to its length. As the pulse trains arrive in the memory unit, they are branched into a parallel loop and sent to one of the inputs of a digital subtraction device. The other input of the subtraction unit is commuted with the memory output. As a result, each pulse train received from the TV camera output is periodically subtracted from an analogous pulse train received from the camera output at the preceding instant. When there are no intruders or fires, the camera transmits continually the same image, which is decomposed into identical pulse trains and the result of their cross subtraction is 0. In case a foreign object appears in the protected space, especially a human being, obscuration, and the like, the camera output begins to transmit pulse trains with time-varying parameters and the signal at the output of the subtraction unit where a nonzero signal will appear. The output of the subtraction unit is connected to a threshold circuit and if the result of subtraction exceeds a certain predetermined threshold value, an acoustic signal is automatically issued warning of the outbreak of a fire or the appearance of an intruder, either directly or via a telephone channel. When such a warning signal is received, the operator of the central station in the occupancy or in the central municipal control station connects his monitor to a communication channel linked to the given TV camera and, by visual observation, analyzes the emergency situation. 2 drawing figs. (RZh)

1182. Masanori K
SMOKE DETECTOR

Swiss Patent No. 590,527; Cl G08B 17/10, A62C 39/02, Appl 20 Jun 1975, Discl. 15 Aug 1977, Priority: Japan, No.U/49-75673, 27 Jun 1974, Assignee: Nohmi Bosai Kogyo Co, Ltd, Tokyo, Japan

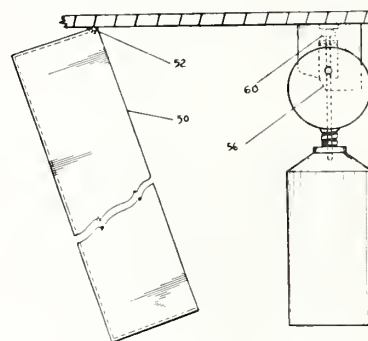
The invention relates to a smoke detector having a smoke measurement chamber with a wall permeable to air but impermeable to light, a radiation source transmitting radiation into the measurement chamber, a radiation receiver disposed outside the direct zone of radiation from the source, and an associated evaluation circuit to give out a signal when scattered radiation is received from the measurement chamber. Smoke penetrates the measurement chamber, is illuminated by the rays from the radiation source, and the radiation scattered from the smoke particles is picked up by the receiver and is analyzed to initiate a fire-alarm signal as soon as the smoke density in the measurement chamber exceeds a certain value. 4 claims, 3 drawing figs.

1183. Beauchamp LR
ALARM SYSTEM AND REMOTE MONITOR PANEL
US Patent No. 4,025,918; Cl 340/409, (G08B 25/00), Appl 20 Feb 1976, Discl. 24 May 1977, Assignee: Inventor, Houston, TX

Disclosed is an alarm system remote monitor panel having a series of control units, each unit being provided with a light cell, diodes and a coil so that when a remote sensor triggers an alarm, the light will be illuminated and the audio unit activated. The audio may be disconnected at the monitor panel, and the light turned off at the sensor. 5 claims, 3 drawing figs. (Author)

1184. Chapman AES
PORTABLE FIRE ALARM
US Patent No. 4,022,148; Cl 116/106, (G08B 17/00), Appl 22 Sep 1975, Discl. 10 May 1977, Assignee: Inventor, Darwen, Lancashire, England

A self-contained fire alarm is described that is activated by a temperature-sensitive release mechanism. The alarm is a simple inexpensive device that requires minimal maintenance and is independent of any electrical power source. 1 claim, 4 drawing figs. (Author)



1185. Conforti FJ and Ogden WL
FIRE DETECTOR
US Patent No. 4,020,479; Cl 340/237 S, (G08B 21/00), Appl 7 Feb 1975, Discl. 26 Apr 1977, Assignee: Pittway Corp, Northbrook, IL

An improved early warning fire detector of the ionization type is provided wherein detection circuitry having adjustable sensitivity is connected to an ionization chamber responsive to products of combustion. A supervisory circuit monitors the unit to assure that power is applied to the unit, that the detecting circuitry is operative and that the unit is operating at the proper sensitivity. 24 claims, 2 drawing figs. (Author)

1186. Delaney LR
HEAT DETECTION AND ALARM SYSTEM
US Patent No. 4,023,164; Cl 340/418, (G05D 23/12), Appl 29 Dec 1975, Discl. 10 May 1977, Assignee: Bituminous Coal Res, Inc, Monroeville, PA

A pressurized source of fluid, either liquid or gas, is supplied through a supply conduit system to a main heat sensitive conduit fabricated from a thermoplastic material and having sealed end portions positioned adjacent a potential source of fire or undesirably high temperature. A plurality of branch heat sensitive conduits are connected to the main conduit and extend therefrom into substantially abutting relation with the object to be monitored. The supply conduit system maintains a selected fluid pres-

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

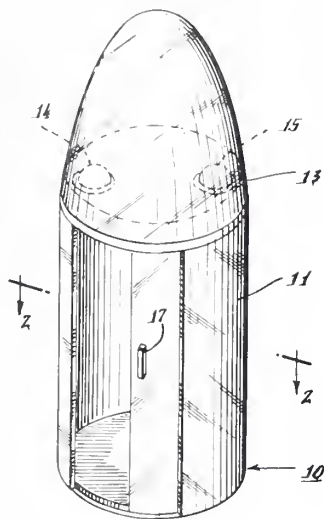
sure within the heat sensitive conduits which are operable to soften and rupture at a preselected temperature, as determined by the system pressure and the diameter and wall thickness of the heat sensitive conduits. When exposed to the excessive preselected temperature, the conduits rupture. A pressure switch connected to the supply conduit system is responsive to a decrease in the fluid pressure and is operable to complete an electrical circuit between an electrical power source and an alarm device for actuating the alarm. Actuation of the alarm device indicates the existence of an undesirably high temperature and may initiate an automatic shutdown procedure. The pressurized fluid may contain a fire retardant material which, upon rupture of any one of the heat sensitive conduits, is discharged to either reduce an undesirably high temperature or extinguish a fire simultaneously with actuation of the alarm. 7 claims, 3 drawing figs. (Author)

1187. Diakantonis T and Sweatt WL

ALARM AND SAFETY CAPSULE

US Patent No. 4,027,304; Cl 340/304, (G08B 21/00), Appl 19 Apr 1976, Discl. 31 May 1977, Assignee: Inventors, Mahopac, NY, and Yonkers, NY

An alarm and a safety capsule includes a booth having a door. A control circuit for the booth includes a switch, for sending an alarm, which is not operative until the booth door is closed, and inhibits closing of the door if attempts are made to operate the button with the door open. A timing circuit responsive to operation of the button prohibits release of the door for a determined period. A further button, energized by the timing circuit, enables an occupant of the booth to unlock the door. The door may also be unlocked by a radio control circuit. 10 claims, 4 drawing figs. (Author)

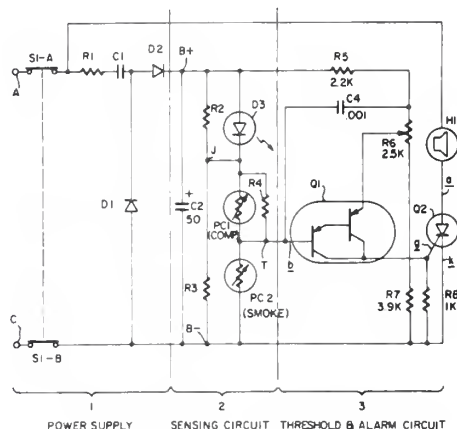


1188. Enemark RB

LED SMOKE DETECTOR

US Patent No. 4,025,915; Cl 340/237 S, (G08B 17/10), Appl 6 Oct 1975, Discl. 24 May 1977, Assignee: Electro Signal Lab, Inc, Rockland, MA

A simplified smoke or other particle detector circuit includes a light emitting diode in series with a compensating photocell and a photocell sensing LED light scattered from particles. In parallel with the LED is a high resistance, and in parallel with the photocells is a low resistance, the resistances having a common junction coupled to a threshold circuit input as is the output of the photocells. Sensing smoke produces a photocell output which triggers the threshold device to generate an alarm signal. Failure of the LED produces a voltage at the resistance junction which similarly triggers the threshold device to alarm. 6 claims, 1 drawing fig.



1189. Gotley P and Buckenham HA

CATALYTIC DETECTING APPARATUS FOR DETECTING COMBUSTIBLE GASES AND VAPORS

US Patent No. 4,020,480; Cl 340/237 R, (G08B 17/10), Appl 21 Apr 1975, Discl. 26 Apr 1977, Priority: UK, No. 18386/74, 26 Apr 1977, Assignee: Neotronics Ltd, Stansted, UK

Disclosed is an apparatus for detecting combustible gases and vapors, comprising catalytic sensors selectively sensitive to the presence in a given environment of a potentially dangerous constituent such as a hydrocarbon gas and arranged to produce a signal representative of the presence of the constituent, a normally deactivated transducer responsive on activation to the output of the sensors and effective to produce an output signal indicative of the presence of the constituent in a concentration above a predetermined level, a pulse generating circuit arranged automatically and periodically to activate the sensors for a selected relatively short interval during which detection but not poisoning can occur and subsequently to deactivate the sensors for a relatively long period, fault detecting circuits for producing a fault signal in the event of circuit failure or impending power failure, and alarm circuitry for providing a differentiated warning in response to the fault signal and in response to the output signal. 11 claims, 2 drawing figs. (Author)

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

1190. Healey WE, Heineman MR, and Erlich RM
DOUBLE DETECTION CIRCUIT FOR CONSERVING ENERGY IN FIRE DETECTION SYSTEMS AND THE LIKE

US Patent No. 4,027,302; Cl 340/227 R, (G08B 17/00), Appl 3 Jun 1976, Discl. 31 May 1977, Assignee: WE Healey and Associates, Inc, Bloomfield Hills, MI

A highly sensitive first stage fire detector which does not use the system's battery power responds to the detection of a predetermined condition indicative of a possible fire in a protected area to energize a relay. The relay closes a first switch to supply battery power to a relatively more accurate, battery-powered, second stage detector and if the second stage detector verifies or affirms the existence of an actual fire, an alarm may be initiated or a fire-extinguishing system discharged, as desired. Since only the second stage detector draws power from the battery, it is normally kept isolated to conserve its charge unless the first stage detector energizes the relay. The circuit may also include a latching timer which insures that the relatively more accurate second stage detector has sufficient time to verify or disaffirm the existence of a fire even if the first stage detector were to immediately return to its normal condition. 15 claims, 7 drawing figs. (Author)

1191. Holland JM
RADIO CENTRAL STATION ALARM SYSTEM

US Patent No. 4,020,477; Cl 340/224, (G08B 1/08), Appl 10 Nov 1975, Discl. 26 Apr 1977, Assignee: American District Telegraph Co, New York, NY

The invention relates to a radio central station alarm system including a central station and a plurality of remote stations for transmitting alarm signals to the central station by means of radio signals. Alarm signals are transmitted repeatedly in a sequence which reduces the probability that signals transmitted by one remote station will be completely obscured by signals transmitted by other remote stations. A pulse position modulation binary data format is used which simplifies both remote and central station apparatus and facilitates error-free data transmission. The central station is highly immune to noise and performs a number of tests on received data signals to reduce or eliminate false or erroneous alarm indications. Latching alarm sensor circuits are provided for use at the remote stations to insure that all transmission sequences are completed. Protective circuits are provided for disabling any remote station which transmits signals for longer than a maximum allowable transmission interval. 15 claims, 12 drawing figs. (Author)

1192. Ishii K and Sato H
IONIZATION TYPE SMOKE DETECTOR

US Patent No. 4,017,733; Cl 250/381, (G01T 1/18), Appl 17 Apr 1975, Discl. 12 Apr 1977, Priority: Japan, No. 49-141990, 12 Dec 1974, Assignee: Hochiki Corp, Tokyo, Japan

In a smoke sensor of the ionization type having as essential component parts an opposing pair of electrodes providing for high impedance effected by ionic current produced by a radioactive ray source, improvements are made to eliminate formation of dew at least on the surface of the radioactive ray source and also prevent the high

impedance from being accidentally changed due to a cause other than smoke, for instance a comparatively intense air stream which may otherwise cause a casual change of the high impedance. 7 claims, 26 drawing figs. (Author)

1193. Ito H, Sugiyama T, Kaminaka Y, Yamamoto Y, Tanigawa T, Shoji S and Saito Y
COMPOSITE-TYPE HEAT-SYSTEM FIRE SENSING DEVICE

US Patent No. 4,020,442; Cl 337/299, (H01H 37/02), Appl 4 Mar 1975, Discl. 26 Apr 1977, Priority: Japan, No. 49-58364, 22 May 1974, Assignee: Hochiki Corp, Tokyo, Japan

Disclosed herein is an improved composite-type heat-system fire sensing device consisting essentially of a differential sensing element and constant-temperature sensing element, capable respectively of actuating a pair of electric contacts. These two types of sensing elements used in customary devices are difficult to assemble and to adjust. There are also serious problems for production and wider utilization of the sensing device. Further, the elements lack practical utilizability as well as reliability. The sensing device of this invention overcomes the above-mentioned problems of the customary devices by effecting sensitivity matching of different operation characteristics of the two sensing elements, and makes it possible to optionally and freely adjust the sensitivity of the sensing device as required in accordance with the conditions of the place of installation of the sensing device so as to ensure a higher reliability and wider application of the sensing device. 8 claims, 17 drawing figs. (Author)

1194. Jacobs ME
IONIZATION DETECTION SYSTEM FOR AEROSOLS

US Patent No. 4,027,165; Cl 250/381, (G01T 1/18), Appl 17 Feb 1976, Discl. 31 May 1977, Assignee: USA, Energy Res and Dev Admin, Washington, DC

This invention relates to an improved smoke-detection system of the ionization-chamber type. In the preferred embodiment, the system utilizes a conventional detector head comprising a measuring ionization chamber, a reference ionization chamber, and a normally nonconductive gas triode for discharging when a threshold concentration of airborne particulates is present in the measuring chamber. The improved system utilizes a measuring ionization chamber that is modified to minimize false alarms and reductions in sensitivity resulting from changes in ambient temperature. In the preferred form of the modification, an annular radiation shield is mounted about the usual radiation source provided to effect ionization in the measuring chamber. The shield is supported by a bimetallic strip which flexes in response to changes in ambient temperature, moving the shield relative to the source so as to vary the radiative area of the source in a manner offsetting temperature-induced variations in the sensitivity of the chamber. 8 claims, 7 drawing figs. (Author)

1195. Knowles RN
CHEMICAL FIRE ALARM

US Patent No. 4,015,015; Cl 424/324, (A61K 31/165), Appl 15 Jul 1975, Discl. 29 Mar 1977, Assignee: EI du Pont de Nemours and Co, Wilmington, DE

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued

A system is disclosed for warning people of a fire hazard comprising a flammable substrate having bound thereto a nonvaporous organic compound of molecular weight below 400, which forms a respiratory irritant upon being vaporized. The organic compound remains bound to the substrate in nonvaporous form under normal conditions of use, but is vaporized from the surface upon exposure to temperature no lower than about 200°C. 11 claims, no drawing figs. (Author)

1196. Lovelock JE

IONIZATION DETECTORS WITH IRON-55 AS A RADIOACTIVE SOURCE

US Patent No. 4,025,794; Cl 250/381, (G01T 1/18), Appl 20 Oct 1975, Discl. 24 May 1977, Priority: UK, No. 45758/74, 22 Oct 1974, Assignee: Inventor, Powerchalke, Salisbury, Wiltshire, England

An ionization detector capable of operation at elevated temperatures and utilizing iron-55 as a radioactive source within the ionization chamber is disclosed. 3 claims, 2 drawing figs. (Author)

1197. Ludt RR, Eggert CA and Skarman J

SMOKE ALARM

US Patent No. 4,021,792; Cl 340/237.5, (G08B 17/10), Appl 23 Jun 1975, Discl. 3 May 1977, Assignee: Wellen Industries, Monterey Park, CA

A smoke alarm having a smoke chamber with at least two inlet ports together with an array of louvered apertures and flue means to provide free access to the smoke chamber for smoke flowing in any direction within a hemispherical zone is disclosed. A circuit is described employing photocells to measure smoke obscuration and reflection by means of an improved wheatstone bridge to sound a loud audible alarm. A relaxation oscillator is coupled to a light source which is used for the optical portion of the smoke alarm. The oscillator produces an alarm to indicate failure of the light source, which alarm is distinguishable from the smoke alarm. A heat sink is thermally coupled to the light source to induce filament vapors to condense on noncritical portions of the light source. 5 claims, 6 drawing figs. (Author)

1198. Okuda Y, Tsunehiko A and Shigeru M

IONIZATION TYPE SMOKE SENSING DEVICE

US Patent No. 4,023,152; Cl 340/237 S, (G08B 17/10), Appl 28 Apr 1975, Discl. 10 May 1977, Assignee: Matsushita Electric Works, Ltd, Osaka, Japan

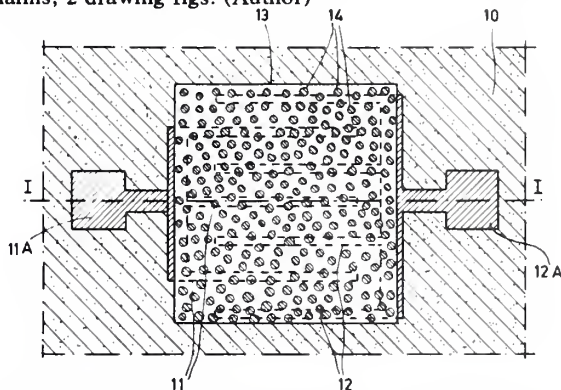
The invention concerns a smoke sensing device of the type having a single ionization chamber wherein stability and reliability are increased by driving the ionization chamber from a square wave oscillator, and utilizing an AC amplifier responsive to the ionization current within the chamber. The AC amplifier serves to amplify the current through the ionization chamber and couple the amplified current to a rectifier and detector adapted to respond to decreases in current, such as caused by smoke particles within the ionization chamber, to activate an alarm device. 3 claims, 10 drawing figs. (Author)

1199. Pompei J, Lacroix B and Pierrot F

SENSOR FOR A GAS DETECTOR, IN PARTICULAR FOR SMOKE DETECTION

US Patent No. 4,016,524; Cl 338/34, (H01L 7/00), Appl 14 May 1975, Discl. 5 Apr 1977, Priority: France, No. 74.18212, 27 May 1974, Assignee: US Philips Corp, New York, NY

The invention concerns a sensor for selectively detecting at least one constituent of a gaseous mixture in contact with the sensor. The sensor comprises a thin layer of a semiconductor material covered with a dielectric film formed with a large number of microscopic openings. 3 claims, 2 drawing figs. (Author)



1200. Suga S

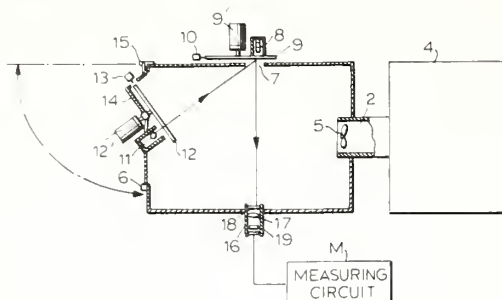
APPARATUS FOR SEQUENTIAL MEASUREMENT OF LIGHT TRANSMITTED THROUGH SMOKE

US Patent No. 4,021,713; Cl 250/574, (G01D 5/36), Appl 29 Mar 1976, Discl. 3 May 1977, Assignee: Inventor, Tokyo, Japan

An apparatus for continuous and sequential measurement of amounts of reflected, diffused and directly transmitted light through smoke. The apparatus has a smoke chamber having a smoke introduction port and a smoke discharge port, and further has an aperture in one wall thereof. A first light source is aligned with the aperture and a first sector member having an aperture therein. A light receiving device is disposed on another wall of the smoke chamber opposite the aperture in the one wall, and a light measuring circuit is coupled to the light-receiving device. A second light source in the smoke chamber is directed toward the aperture in the one wall to strike the first sector member at an angle to the surface thereof, and a second sector member is rotatably mounted in the smoke chamber for movement between the second light source and the aperture in the one wall and has an aperture therein for alignment with the second light source. Sector member driving means connected to the sector members drives them in synchronization for aligning the aperture in the second sector member with the second light source when white reflection and black reflection portions of the first sector member are aligned with the aperture in the one wall, and for aligning the remainder of the second sector member with the second light source when the aperture in the first sector member is aligned with the first light source and the aperture in the one wall. 6 claims, 6 drawing figs. (Author)

5. FIRE PROTECTION OF STRUCTURES

b. Detection and Alarm—Continued



1201. Solomon EE

IONIZATION DETECTOR

US Patent No. 4,021,671; Cl 250/381, (G01N 23/12), Appl 7 Jul 1975, Discl. 3 May 1977, Assignee: Gulf and Western Mfg Co (Systems), New York, NY

The invention relates to an ionization detecting fire alarm device that comprises a double chamber structure, a source disposed in at least one of the chambers and a vernier adjusting screw electrode protruding into one chamber. The chamber containing the adjustable electrode is more open to the atmosphere than the other chamber, porting is provided between chambers and detection occurs by sensing the rate of change of ionization current in the chamber structure. The source or sources, one being in each chamber, is a beta source such as a nickel 63 source. A change in ionization current is detected by a unique circuit of this invention which comprises a programmable unijunction transistor oscillator circuit. 19 claims, 4 drawing figs. (Author)

1202. Stockman RF

FIRE DETECTOR SCANNING ARRANGEMENT

US Patent No. 4,022,270; Cl 16515, (F28D 19/04), Appl 17 Feb 1976, Discl. 10 May 1977, Assignee: The Air Preheater Co, Inc, Friendship, NY

A detector is disclosed that monitors infra-red ray emission from an air preheater to detect a temperature rise that precedes a fire within the air preheater. The detector of infra-red rays is alternately moved between a "detecting" stage within the air preheater and a "cleaning" stage in clean ambient air where particulate matter deposited thereon by dirty gas may be removed to maintain the detector at a high degree of operating efficiency. 5 claims, 4 drawing figs. (Author)

c. EVACUATION MEANS AND ESCAPE SYSTEMS

1203. Flachglas AG (Co)

AUTOMATIC RELEASE MECHANISM FOR ROOF EVACUATION TRAPDOORS

Belgian Patent No. 825,306; Cl A62B, E06C, Appl 7 Feb 1975, Discl. 2 Aug 1977, Priority: FRG, No. P 24 11 652.7, 12 Mar 1974, Assignee: Flachglas AG, FRG

The invention concerns an automatic release mechanism for a roof trapdoor intended for evacuation from

buildings. Fixed to the evacuation trapdoor is a two-armed lever which can be pivoted about its axis of rotation, one end of which is connected to the drive end of the opening unit, the other end being connected by a traction means to the release mechanism, the path of rotation of the lever being limited by means of a stop or some similar component at the distance necessary for release.

1204. Bruggert P

SELF-RESCUE DEVICE

French Patent No. 2,317,948; Cl A62B 37/00, Appl 16 Jul 1975, Discl. 18 Mar 1977, Assignee: Inventor

A patent is disclosed for a personal escape device for the evacuation of buildings. According to the invention, the device is distinctive in that it comprises a rope coiled around a support forming one piece with a rotating shaft mounted approximately horizontally on a fixed frame, a rate-of-rope-payout meter rigidly fixed to the rotating shaft, a braking device which acts on the shaft, and a brake control mechanism connected to the rate-of-payout meter. 7 claims, 2 drawing figs.

1205. Garcia Prieto F

FIREFIGHTING AND RESCUE-APPARATUS, IN PARTICULAR FOR PEOPLE TRAPPED IN TOWER BUILDINGS

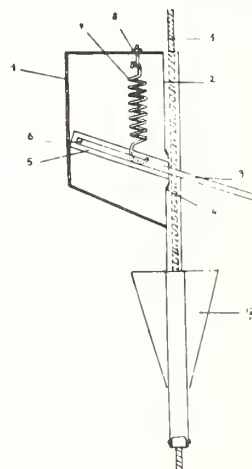
French Patent No. 2,320,117; Cl A62B 1/06; B66B 9/00, Appl 5 Aug 1975, Discl. 4 Mar 1977, Assignee: Inventor

The aim of this continuation of a prior invention is to replace the pulley attachment device of the prior invention on the terrace of the tower by a hook ring, which constitutes a much simpler solution. The rescue device modified by this patent continuation is composed of two assemblies, the lower assembly with the impeller (or the carrier assembly) which supports the upper assembly composed of a rotating hook ring and the pulley, or an overhanging hook fixed to the outside of the terrace of the tower. 3 claims, 2 drawing figs.

1206. Soenen AM

DEVICE PERMITTING CONTROLLED DESCENT OF LOADS OR PEOPLE FROM HEIGHTS

French Patent No. 2,324,319; Cl A62B 1/20, Appl 23 Sep 1974, Discl. 15 Apr 1977, Assignee: Inventor



5. FIRE PROTECTION OF STRUCTURES

c. Evacuation Means and Escape Systems—Continued

Disclosed is a device that permits safe controlled descent from heights, distinctive in that it comprises a single gripping component incorporated into a device designed to ensure absolute clamping upon stopping solely by the weight of the load supported by the device. The clamping means consists of a simple lever disposed at a certain angle with adjunct spring or springs to maintain tension and assuring safe clamping when the assembly is at rest. A seat is provided, of one piece with the descent apparatus, thus ensuring additional safety. The spring or springs assure the user of progressive controllable descent, controlled by a lever independent of the load attachment system. 4 claims, 3 drawing figs.

designed for use of only one person, it is proposed that several cantilevers with these escape apparatus be mounted along each wall on the roof of the highrise building. 9 drawing figs. (RZh)

1209. Maeda S

FIXED EXTENSIBLE ESCAPE LADDER

Japanese Patent No. 51-46358; Cl 95 C 1, (A62B 3/00), Appl 9 Dec 1972, Discl. 8 Dec 1976, Assignee: Shirota Tekko KK

The design and method of use of an extensible, multi-sectional escape ladder intended for the evacuation of people and property from highrise buildings during a fire are proposed. Normally the ladder is folded in a horizontal position fixed to the roof of the highrise building; more precisely, it is fixed to two rail guides rigidly attached to the roof. In case of fire the ladder can be operatively placed into the working position; to do so, a catch which prevents free movement of the ladder along the guide rails and its extension is released manually. While remaining in the horizontal position the ladder is extended by hand out to the required length, a considerable portion of it overhanging the edge of the roof. Then the extended portion of the ladder, by means of a system of hinges and counterweights, is lowered through the required angle so that the projecting end of the ladder drops to the roof of an adjacent building of lesser height. Then all the sections of the ladder are rigidized by means of several clamping devices and evacuation can begin by transfer to the roof of the adjacent building. The invention solves to a great degree the problem of evacuation from a highrise building, because people located on the upper floors experience the greatest danger during fires in such buildings. 2 drawing figs. (RZh)

1210. Yamamoto M

SALVAGE APPARATUS

Japanese Patent No. 51-47997; Cl 95 C 2, (A62B 1/20), Appl 31 Dec 1972, Discl. 17 Dec 1976, Assignee: Inventor

The proposed apparatus is a sleeve of comparatively large diameter (about 1 meter) made of elastic material and designed to salvage valuables from upper-floor windows of buildings in case of fire. Normally the sleeve is in a folded state fixed to the window opening of the upper floor. During a fire the sleeve is placed in the working position by hand, the unattached end of the sleeve being simply lowered until it reaches the ground; the sleeve straightens out in the process of lowering. Owing to the elasticity of the material and the coiling shape of the sleeve, items lowered from a window in the sleeve reach the ground almost without acceleration. (RZh)

1211. Zephinie G

INSTALLATION DESIGNED TO DECELERATE THE FALL OF A BODY

Swiss Patent No. 588,265; Cl A62B 1/20, B65G 11/20, Appl 4 Jun 1974, Discl. 31 May 1975, Priority: France, No. 73.20410, 5 Jun 1973, Assignee: Soberal SA, Luxembourg

A patent is disclosed for an installation designed to slow down the fall of a body, applicable to the rescue of people in danger or to the evacuation of loads, the

1207. Naka H and Yashio S

ESCAPE APPARATUS

FRG Patent No. 2,549,531; Cl E06C 9/08, A62B 5/00, Appl 5 Nov 1975, Discl. 14 Apr 1977, Priority: Japan, Conv No. 114269-75, 23 Sep 1975, Assignee: KK Naka Gijutsu Kenkyusho, Sapporo, Japan

An escape apparatus for a building is disclosed, characterized by a stowage structure which can be anchored in a floor opening of a room, a veranda, or the like of a building, upper and lower covers articulated at the top and bottom sides of the structure, at least one control mechanism connecting the two covers and so articulated that each cover opens or closes when the other is closed or opened, the upper cover being held essentially in an upright position, a telescopic escape-path device exhibiting a number of telescopically connected tube sections of different size, the cross section of the tube sections decreasing from top to bottom, each tube section having a rung at its lower end, the topmost tube section being rotatably mounted in the structure, the entire escape-path device being telescopically collapsed in the stowage structure, resting on the lower cover, the tube sections deploying telescopically to or near the ground when the covers are opened. 15 claims, 8 drawing figs.

1208. Idegami M and Matsubaka I

ESCAPE APPARATUS FOR EVACUATION OF PEOPLE FROM THE UPPER FLOORS OF HIGHRISE BUILDINGS

Japanese Patent No. 51-46359; Cl 95 C 2, (A62B 1/08), Appl 1 Dec 1972, Discl. 8 Dec 1976, Assignee: Inventors

The invention relates to the design and operating principle of an escape apparatus in the form of a set of blocks, cables, counterweights and other mechanical components suspended from a cantilever fixed to the roof of a highrise building and designed for the evacuation of individuals from the windows of the upper stories of highrise buildings during a fire. The principal difference between this apparatus and analogous apparatus and systems of prior embodiments is the fact that the person being evacuated is able to regulate the speed of descent by means of appropriate control levers. In the folded state the apparatus is compact and can be put into the operating position almost instantaneously. Since this apparatus is

5. FIRE PROTECTION OF STRUCTURES

c. Evacuation Means and Escape Systems—Continued

people or loads being located in at least one premise high above ground level, comprising at least one elastic sleeve open at both ends, vertical or strongly inclined, formed with a flexible wall, elastic in the transverse direction of the sleeve, with the upper end held open and fixed to the walls of the building or premise in which the people or loads to be evacuated are located, distinctive in that it comprises a second sleeve, called the inner sleeve, which is formed by a flexible wall, essentially inextensible, at least in the longitudinal direction of the sleeve, which is disposed in and surrounded by the elastic sleeve, with cross-sectional perimeters at least equal to the maximum permissible cross section of the elastic sleeve, also fixed at the upper end to the walls of the buildings or elevated premise. 19 claims, 11 drawing figs.

1212. Carroll WE

METHOD FOR COMPUTING AND EVALUATING EMERGENCY PRIORITY AND EVACUATION ROUTES FOR HIGH RISE BUILDINGS, MINES AND THE LIKE
US Patent No. 4,023,146; Cl 340/172.5, (G06F 3/00), Appl 3 Feb 1976, Discl. 10 May 1977, Assignee: Inventor, Longwood, FL

An evacuation priority system for use in installations having a plurality of separate areas therein includes a plurality of detecting means, such as fire or smoke detectors, each for detecting an appropriate alarm condition in the respective area. Inputs from each area responsive to the alarm condition are received by a central processing unit (CPU), and a priority is computed between the inputs on a predetermined basis dependent upon the relative emergency between the alarm conditions detected. An evacuation route is then selectively fed into an indicating means within each area, on a priority basis or simultaneously, to identify appropriate evacuation routes from each area. Information received by the CPU is forwarded to the appropriate emergency agency, for determining the appropriate equipment and manpower to be used. In addition, information received and processed by the CPU is stored to document the emergency to help reconstruct and avoid similar occurrences. 5 claims, 1 drawing fig. (Author)

1213. Fisher JM

ESCAPE SLIDE AND PLATFORM ASSEMBLY
US Patent No. 4,018,321; Cl 193/25 B, (B65G 11/10), Appl 21 May 1976, Discl. 19 Apr 1977, Assignee: The BF Goodrich Co, Akron, OH

An inflatable, generally horizontal, elevated platform fastened to a supporting structure is connected to an inflatable escape slide extending downwardly at an inclination from the platform to a lower surface. An elongated tension strap is connected at one end to the platform adjacent the supporting structure and at the other end to the slide at a position around midway down the slide to reinforce the platform and maintain the horizontal position of the platform under the weight of persons using the platform and slide. The slide may have a laterally extending inflatable member on the underside with longitudinally extending slide reinforcing tension members cooperative with the laterally extending inflatable member to provide a truss-like structure. The tension strap for reinforcing the platform may be connected to the slide at a position at the laterally extending inflatable member

at one end and be connected to the platform at a position adjacent to supporting structure at the other end. The platform also may have an edge connected to the slide which is not parallel to the edge adjacent the supporting structure, in which case the tension member is located on the side of the platform where the edges are the greatest distance apart. 11 claims, 4 drawing figs. (Author)

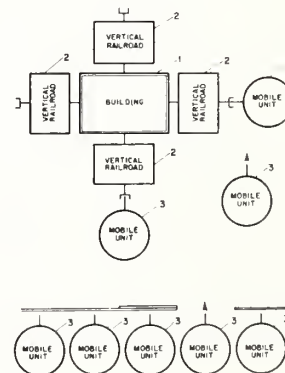
1214. Giffin LW

MECHANICAL SUPPORT APPARATUS FOR THE STABILIZATION OF AN INFLATABLE ESCAPE SLIDE
US Patent No. 4,013,247; Cl 244/137 P, (B64D 25/14), Appl 30 Dec 1975, Discl. 22 Mar 1977, Assignee: The Boeing Co, Seattle, WA

A support apparatus for stabilizing an inflatable aircraft escape slide both during deployment and use is disclosed. The support apparatus includes a series of panels or links that are hinged together to form a mechanical girt (support). The upper end of the mechanical girt is attached to a girt bar that is mounted near the lower region of the aircraft egress door to secure the upper end of the escape slide. The mechanical girt is deployed through the aircraft door with the escape slide. As the girt swings against the exterior surface of the aircraft, latching mechanisms automatically engage mating catches located on the aircraft exterior near the sill of the aircraft door and at a location near the lower edge of the mechanical girt to securely fasten the mechanical girt to the exterior surface of the aircraft. A lower girt bar that extends across a lower region of the girt is connected to the inflatable escape slide by a lower girt. The lower girt is dimensioned and arranged to be under tension prior to the full inflation of the escape slide to thereby stabilize the escape slide as it is inflated and utilized for descent. In addition to (or in place of) the lower girt, stabilizing straps are connected from the lower edges of the mechanical girt to positions on the escape slide that are located outwardly of the upper slide terminus. These straps are also dimensioned and arranged to be under tension prior to the full inflation of the escape slide to thereby stabilize the slide. 15 claims, 8 drawing figs. (Author)

1215. Lyons ME

EMERGENCY BUILDING ACCESS APPARATUS
US Patent No. 4,018,306; Cl 187/6, (B66B 9/00), Appl 3 Mar 1975, Discl. 19 Apr 1977, Assignee: Inventor, Kaneohe, HI



5. FIRE PROTECTION OF STRUCTURES

c. Evacuation Means and Escape Systems—Continued

An emergency building access apparatus permitting ready access to a multi-story building on fire and rapid evacuation of occupants from a choice of multiple emergency exits on each floor by a safe and dependable means is a multiple of vertical railroads attached to outside walls of the building each coupled, for the emergency, to its mobile unit having a railcar, its own power source, a drive mechanism, and controls. 15 claims, 36 drawing figs.

1216. Murukurthy RK

LADDERLESS SAFETY ESCAPE DEVICE

US Patent No. 4,026,385; Cl 182/75, (A62B 1/10), Appl 19 Jan 1976, Discl. 31 May 1977, Assignee: Inventor, Monroe, NY

A ladderless safety escape device includes a cable drum upon which a cable is wound having means secured to the free end thereof for the support of a person. A braking mechanism is operatively connected to the cable drum for controlling the rate of descent of the person. A brake control mechanism is provided for operatively disconnecting the brake mechanism from the cable drum during re-winding of the cable and insures operative connection of the brake mechanism and cable drum during unwinding of the cable. 4 claims, 3 drawing figs. (Author)

1217. Pickard JF and Pickard GS

FIRE ESCAPE INSTALLATION

US Patent No. 4,024,928; Cl 182/19, (A62B 3/00), Appl 24 Dec 1975, Discl. 24 May 1977, Priority: UK, No. 726/75, 8 Jan 1975, Assignee: Montrose Properties Ltd, England

A fire escape unit for installation in buildings such as hospitals includes a hinged platform upon which a movable load such as a bed to be evacuated in an emergency is mounted. The hinged end of the platform is adjacent a hinged portion of an external wall of the building and in the event of a fire the hinged platform is released to adopt an outwardly sloping position and the external wall portion hinged outwards to form an inclined ramp, onto which the bed rolls from the platform, the platform lifting to fill the aperture in the external wall after the bed has passed through to minimize the ingress of air. 10 claims, 2 drawing figs. (Author)

d. EXTINGUISHING AGENTS, ADDITIVES, AND EQUIPMENT

1218. Lindenmann WA [*Brand-Verhuetungs-Dienst fuer Industrie u. Gewerbe, Zurich, Switzerland*]**LIMITS TO THE USE OF HALOGENATED HYDROCARBONS AS EXTINGUISHANTS**

Chimia; 31(7):281-282, 1977 (German)

A brief history of the use of halons, the compounds used, and a cost-benefit comparison, are given. Limita-

tions to the use of halons are established on the basis of the type of fire to be expected, of the hazard to human life owing to the fire, the extinguishant or the decomposition products, corrosion of the protected objects, possibility and costs of unnecessary actuation, and alternative protective concepts. 1 table.

1219. Kunigawa A

EQUIPMENT FOR EXTINGUISHING TRANSFORMER FIRES

Denki Keisan; 45(1):57-62, 1977 (Japanese)

An analysis is made of the specific features of the outbreak, development and extinguishment of fires in fixed power and measurement transformers resulting from the presence of a large quantity of combustible oil (20-80 tons) and of the possibility of injury to personnel and firefighters from the electric current. A description is given of the design and operating principle of several models of fixed fire-extinguishing systems in transformer substations. The automatic features of actuation of fire-extinguishing systems and also the design of sprinkler heads are examined. It is pointed out that the use of solid, directed water sprays is the most effective way of knocking down the flame, but that in this case it is not without danger owing to the high electrical conductivity, which might result in the hazard of the high-voltage electrical circuit shorting on the housing of the extinguishing system, the water piping and the sprinkler heads. In view of this fact, fire sprays with a cone discharge angle of 40-150° are optimal. Four types of sprinkler heads of varying construction are considered, all using discharge orifices of different configuration and orientation and internal spray components and providing the desired hydrodynamic qualities for the extinguishing spray, the water pressure in these systems is 3.5 - 8 kgs/cm² at a discharge rate of up to 115 l/min·n². 15 figs, 6 tables. (RZh)

1220. Eggert G [*Veba Kraftwerke Ruhr AG, Herten, FRG*]
WATER-SPRAY EXTINGUISHING SYSTEMS FOR TRANSFORMERS

Elektrizitaetswirtschaft; 76(10):267-270, 1977 (German; English Summary)

The increasing use of large transformers and the confined spaces in which they are installed make it essential to extinguish transformer oil fires as quickly as possible. Fixed, automatically triggered extinguishing systems consisting of a free-standing pipe frame with upper and lower spray rings and pipe strings above and below the transformer are suitable for this purpose. With these systems the extinguishing process begins within 15 to 20 sec after triggering. A prerequisite for rapid response is a short water supply line (up to about 20 m) between the valve station and the spray pipes. The design to be adopted for a specific operating situation depends on the water supply potentials and the way the system is used. Described in this article is the structure and operation of such a system, the water supply method (city water line or standpipe, power plant cooling circuit, pressurized or elevated container) and the triggering methods. 8 figs, 1 table, 3 refs.

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

1221. Okubo H

FIRE EXTINGUISHING SYSTEMS FOR FIXED OIL TANKS*Enerugi*; 10(3):53-57, 1977 (Japanese)

An analysis is made of the main trends for increasing the fire safety of various types of oil reservoirs, especially fixed cylindrical tanks for the storage of liquid petroleum products. Various versions of technical embodiments of a method of extinguishing such tank fires by injecting the extinguishant under high pressure directly into the bulk of the petroleum product through the tank wall (through a special pipe installed in the tank wall near the bottom) are examined. A low-expansion foam generated with fluorocarbon fire-extinguishing surfactants is recommended as the extinguishant, being the most suitable one in conjunction with this method. This foam extinguishant, with an expansion ratio of 10-12, passes through a layer of petroleum product without disintegrating and forms a continuous layer on its surface, preventing petroleum vapor from reaching the combustion zone. The results of tests of several such automatic extinguishant systems, permanently connected to the tank through rigid pipes, are given. High-pressure generators are used in these systems, producing 500-1200 ℓ /min of low-expansion foam at a pressure of 8 kgs/cm². The high efficiency of this extinguishing method, combined with conventional methods of delivering extinguishants directly to the surface of the burning petroleum product, is emphasized. 6 figs, 3 tables. (RZh)

1222. Crosby G, Jr and Mackay DJ, Jr [*Advanced Safety Sys, Inc*]**TESTING HALON 1301 SYSTEM DESIGN***Fire J*; 71(5):74-75, 107-110, 1977

The procedures described in the article are the final steps in the installation of an automatic Halon 1301 fire suppression system, covering system design for a specific facility (a large engineering company in Boston, MA), the test program and test procedure in the facility. It is emphasized that there is no substitute for an actual discharge test, which must be conducted on every installation. 6 figs.

1223. Northey J [*Fire Protection Association, UK, Tech Dept*]**HALON EXTINGUISHING AGENTS***Fire Prev*; (122):22-24, 1977

Examined in this article are the extinguishing characteristics, toxicity, and other properties of halons, with particular attention being paid to the three halons 1211, 1301, and 2402. 2 tables, 4 refs.

1224. Breen DE

INTERACTIONS IN BINARY HALON MIXTURES USED AS FIRE SUPPRESSANTS*Fire Technol*; 13(4):261-265, 281, 1977

A limited number of Class B fire suppression tests involving manually applied combinations of Halon 1301 and Halon 1211 indicate that mixtures having weight ratios of 50:50 may achieve fire extinguishment with approximately 35 percent less mixed agent, on a median basis, than is required for either of the pure halons. Intermediate in agent economy were formulations having weight ratios

of 25:75 and 75:25. A majority of the tests conducted with each of these halon formulations resulted in extinguishment, thus permitting identification of median extinguishment times for the formulations. A 21 percent minority of fires were not extinguished, suggesting that the manual application technique used in the test procedure contained a source of variance outside the control of the investigator. 1 fig, 1 table, 4 refs. (NFPA)

1225. Hirst R and Booth K [*ICI Mond Div*]**MEASUREMENT OF FLAME-EXTINGUISHING CONCENTRATIONS***Fire Technol*; 13(4):296-315, 1977

Flame-extinguishing concentrations of Halon 1301 and Halon 1211 for inclusion in the *Standard on Halogenated Extinguishing Agent Systems - Halon 1301, NFPA 12A* and the *Standard on Halogenated Extinguishing Agent Systems - Halon 1211, NFPA 12B* were measured in a simple laboratory apparatus. The concentrations were higher than those recorded in a number of full-scale tests. The reason for the stability of the laboratory flame is discussed. The effect of fuel temperature was studied, and extinguishing concentrations were measured for thirteen halons and diluents against a number of fuels. 8 figs, 3 tables, 16 refs. (NFPA)

1226. Anon

FOAM EXTINGUISHING SYSTEM FOR BURNING LIQUIDS*Kogai to Taisaku*; 13(1):110, 1977 (Japanese)

A brief description is given of a foam fire-extinguishing system for liquid petroleum products stored in large-capacity reservoirs as used in a Japanese petrochemical plant. A particular feature of the system is the method of applying the foam to the mass of petroleum through a special pipe connection in the side wall of the reservoir. The foam is formed from a foam-generator powder consisting of a mechanical mixture of aluminum sulfate, sodium bicarbonate, and foam concentrate. A fire in a gasoline-filled tank measuring 8 m in height and 8.7 m in diameter was extinguished in 10 min by a 70-100-X foam during tests whose results are given. A brief description is given of the mechanism of formation of the protective film on the surface of the burning oil product. Future plans for the introduction of analogous systems in many Japanese petrochemical plants, as well as in oil storage tanks, are reported.

1227. Matsumoto T

INERT GAS METHODS OF PREVENTING FIRES FROM GAS EXPLOSIONS*Ohm: Denki Zasshi*; 64(4):52-53, 1977 (Japanese)

A detailed review is given of the possibilities, effectiveness and outlook for the use of inert gases to prevent fires resulting from the explosion of hazardous gases during the transportation, use, and storage of these gases, as well as to extinguish such fires. The most effective of these gases are discussed in detail as regards distinctive features, ranges of application, hypothetical compositions, stability, and the like, namely, carbon dioxide, nitrogen, argon, and a number of volatile substances containing halides (halohydrocarbons), eg, tetrafluorodibromomethane, ethyl and ethylene bromide, and trifluorobromomethane. 4 figs, 2 tables, 6 refs. (RZh)

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

1228. Petrov I, Vasil'ev A and Rubtsov Yu
AUTOMATIC COOLING OF TANKS
Pozhar Delo; (4):22-23, 1977 (Russian)

A two-phase method of watering down tanks to cool them during a fire has been developed. A water spray is applied to the tanks at varying rates. When a certain section of the tank heats up to a prescribed temperature, thermal detectors are actuated and sprinklers delivering water at a rate of 0.2 $\ell/\text{sec m}$ are turned on, which is the rate required by the standards to cool tanks adjacent to the one on fire. If the tank catches fire or the wall temperature increases despite the water cooling, detectors with a higher melting temperature are actuated and water is delivered from additional sprinklers at a total rate of 0.5 $\ell/\text{sec m}$, the standard rate for cooling a burning tank. The sprinklers have a wide spray head and discharge rates of 1.25-6.0 ℓ/sec . (RZh)

1229. Bamert AE
FIRE PROTECTION IN UNDERGROUND PREMISES
Rev Tech Feu; 18(166):18-21, 1977 (French)

As a rule, modern highrise buildings have a multi-story underground section used for the storage of various materials, parking cars, and other purposes. Fires in underground areas are accompanied by high temperatures and intense evolution of smoke, extinguishment is impeded by the difficulty of finding the seat of the fire and getting at it. In Switzerland full-scale tests have been conducted to study the nature of the development of fires in underground garages and ways of extinguishing them. It was found that flame flashover from one burning car to the next is not very probable, but must not be ruled out, while total fire involvement is possible when a large amount of fuel is present, eg, when fuel spills as a result of a collision. The tests have shown that fires in underground premises can be fought effectively only by using special technical means such as automatic fire detection and extinguishing systems and smoke removal devices. It was found that a sprinkler system checks fire development, but burning continues inside cars, leading to continued smoke logging. The smoke removal system should be turned on only after the sprinkler system is turned off. In some premises containing only small concentrations of combustible materials, it may not be necessary to install an automatic fire extinguishing system, but a smoke-removal system is always necessary. The results of tests conducted in France are given. (RZh)

1231. Siemens AG (Co)
APPARATUS TO GUIDE EXTINGUISHANTS FOR CABLE FIRES

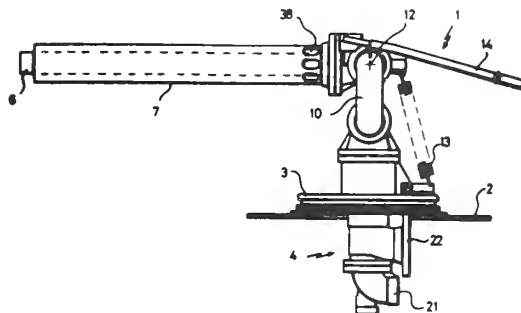
Belgian Patent No. 823,504; Cl A62C, H02B, H02G, Appl 18 Dec 1974, Discl. 9 Mar 1977, Priority: FRG, No. P 23 63 560.1, 20 Dec 1973, Assignee: Siemens AG, Munich and Berlin, FRG

Disclosed is an apparatus for guiding extinguishants to extinguish cable fires disposed in the cable trays. The raised edges of a cable tray are composed of a vertical edge and a flanging section in the shape of a triangular hollow cavity provided with openings. The extinguishant is guided to the seat of the fire through the hollow cavities, which are made of bent sheet steel as a synthetic material. Nozzles to ensure distribution of the extinguishant are inserted in the openings, making it possible to do without additional extinguishant supply arrangements.

1232. Albach und Co
FIRE EXTINGUISHER

French Patent No. 2,322,623; Cl A62C 31/02, Appl 2 Sep 1976, Discl. 1 Apr 1977, Priority: FRG, No. P 25 39 825.8, 8 Sep 1975, Assignee: Albach und Co, FRG

Disclosed is a fire extinguisher comprising a nozzle for the discharge of a jet of powder and an arrest mechanism mounted on the nozzle, which is sensitive to the pressure of the powder and which closes the nozzle when powder discharge stops. The device includes a spring-loaded



valve-stem which can slide in the axial direction and is distinctive in that when this extinguisher is designed as a fire monitor and has an additional nozzle for discharging a water or foam jet, the slide path of the valve-stem when in the open position to regulate the discharge rate of the powder is limited by an adjustable outer stop. 4 claims, 2 drawing figs.

1230. Dion-Biro G
IMPROVED PROCEDURE FOR PRESSURIZING TANKS DESIGNED FOR FIREFIGHTING EQUIPMENT
Belgian Patent No. 823,940; Cl A62C, Appl 27 Dec 1974, Discl. 9 Mar 1977, Assignee: SA Biro Fils, Paris, France

A procedure for pressurizing a tank is disclosed, distinctive in that a quantity of gas necessary for instantaneous pressurization of firefighting equipment is introduced directly into the tank from a primary supply source.

5. FIRE PROTECTION OF STRUCTURES

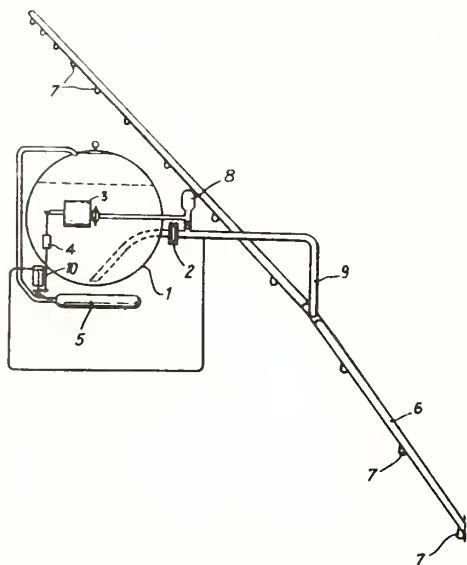
d. Extinguishing Agents, Additives, and Equipment—Continued

1233. Co Centrale Sicli

AUTOMATIC FIRE PROTECTION INSTALLATION

French Patent No. 2,325,395; Cl A62C 37/26, Appl 29 Sep 1975, Discl. 22 Apr 1977, Assignee: Compagnie Centrale Sicli

The invention concerns an automatic fire protection installation in which the pipes, filled with a water-base premixed extinguishant, serve mixed detection and spray heads, an extinguishant tank being connected to the pipes via a rupturable isolating diaphragm in the passive state, the premixed extinguishant, a flask of propelling gas being connected to the tank, closed in the inactive state, distinctive in that an auxiliary plunger, driven by the pressure in the pipes, is provided to open the gas flask in the case of excess pressure in the pipes. 1 claim, 1 drawing fig.



1234. Gleizes GA

COMPACT COMPOSITE GLASS-BREAKER/FIRE EXTINGUISHER

French Patent No. 2,323,552; Cl B60R 23/00, A62C 23/00, Appl 9 Sep 1975, Discl. 8 Apr 1977, Assignee: Inventor

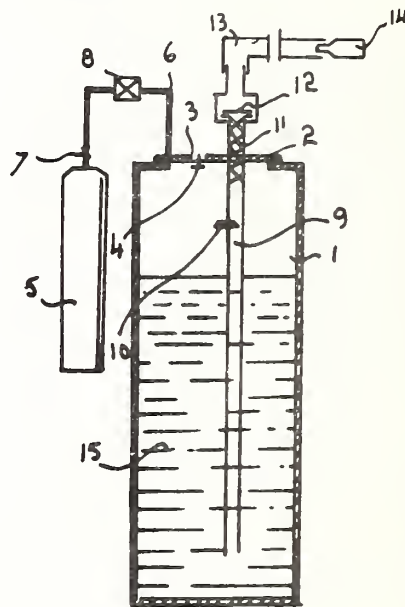
The invention relates to compact combination of a glass-breaking mass and a fire extinguisher having at its base a mass of material, of shape and weight capable of breaking the windows of cars involved in accidents so as to release the occupants rapidly. The axis of the mass forms an extension of the axis of the extinguisher so as to make the device less cumbersome and to facilitate mounting in a holder. The shape of the mass is conical, the base of the cone being connected to the base of the extinguisher by some appropriate means, releasable after breaking the glass and freeing the occupants to free the extinguisher for immediate use. 5 claims, 2 drawing figs.

1235. Kossowski B

FIRE EXTINGUISHER WITH CONSTANT RELATIVE PRESSURE AND AUTOMATIC PRESSURE COMPENSATION

French Patent No. 2,323,408; Cl A62C 13/26, Appl 4 Jan 1974, Discl. 8 Apr 1977, Assignee: Inventor

The disclosure relates to a fire extinguisher with constant relative pressure and pressure compensation, permitting, by simplified construction, discharge of all extinguishants and, among others, physical gas-injection foams while achieving improved operation in an environment to any external pressure or pressure decrease, avoiding the double operation of opening and closing, risk-free maintenance and double operational safety, even when components are not functioning, characterized by the functional combination of a flap valve blocking a pressure-compensation orifice and preventing overflow of extinguishant during operation and a low-pressure rupture membrane at the extinguishant outlet in the upper part of the plunger tube, avoiding double operation assuring a good seal in case of maintenance, as well as pressure compensation. 5 claims, 4 drawing figs.



1236. Rotvand G

FOAMING COMPOSITION

French Patent No. 2,318,222; Cl C11D 1/12, A62D 1/00, Appl 16 Jul 1975, Discl. 18 Mar 1977, Assignee: Inventor

The present invention relates to a composition for making fire-extinguishing foam. As the essential foaming product it contains an alkylarylsulfonate of alkali metal, an alkylarylsulfonate of alkali-earth metal, an alkylarylsulfonate of amine salts or a mixture of these alkylarylsulfonates, especially alkylbenzenesulfonate. 9 claims, no drawing figs.

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

1237. Sentinella VE

FIRE EXTINGUISHER MOUNTING

French Patent No. 2,323,409; Cl A62C 23/04, B60R 23/00, Appl 1 Oct 1976, Discl. 8 Apr 1977, Priority: UK, No. 11,384/1974, 18 Oct 1973, Assignee: Inventor

The invention relates to a holder for a fire extinguisher, distinctive in that it comprises a frame vertically attachable to a support, a bracket assembly fixedly attached to one end of the frame in transverse position, a drag-link system pivotally attached to a point at the end of the bracket assembly, a system for the application of force arranged to contact one end of an extinguisher during use mounted at another point on the drag-link assembly, the drag-link assembly being capable of being displaced through a neutral position between a first position in which the force-application system is away from the bracket assembly and a second position in which the force-application system is closer to the bracket assembly, one of these positions definitely a released position, the other a retained position in which the force-application system, during use, forces the other end of an extinguisher against a bracket, and a control lever connected to the drag-link assembly so as to displace it from the first to the second position. 10 claims, 3 drawing figs.

1238. Herblin C

FIRE EXTINGUISHANT

FRG Patent No. 2,645,526; Cl A62D 1/00, Appl 8 Oct 1976, Discl. 14 Apr 1977, Priority: France, Conv No. 7530866, 8 Oct 1975, Assignee: Inventor

The invention relates to a fire extinguishant, distinctive in that it consists of an incombustible powder to which a liquid is added in which the powder is not soluble, the density of the powder being less than that of the liquid. The liquid is a mixture of water, eg, pure or salt water, an oil, a halogen compound, eg, chlorobromodifluoromethane, the liquid in solution containing a fluorocarbon product, etc. 10 claims, no drawing figs.

1239. Kennington R, Woolhouse RA and Runcorn C

METHOD FOR PRODUCING A FIRE EXTINGUISHANT

FRG Patent No. 2,652,044; Cl A62D 1/00, Appl 15 Nov 1976, Discl. 2 Jun 1977, Priority: UK, Conv No. 47040-75, 14 Nov 1975, Assignee: Imperial Chemical Industries Ltd, London

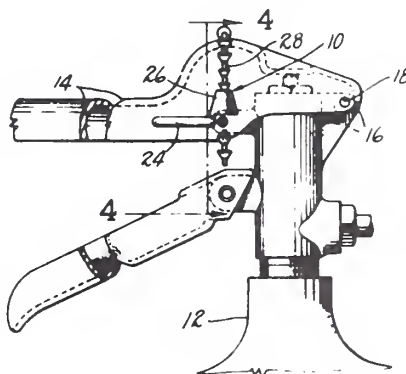
A method is disclosed for producing a fire extinguishant containing a compound with the empirical formula $MC_2N_2H_3O_3$, where M is potassium or sodium, by converting a mixture of urea and an alkali compound from the hydroxide group and sodium or potassium carbonate, distinctive in that solid particulate urea or urea and alkali compound in solid particulate form is added to a thoroughly agitated bed of solid particulate material, the bed of particulate material being heated to a temperature ranging from 95 to 200°C and, if only urea is added, containing at least one alkali compound, the rate of addition of the urea or the urea and alkali compound being controlled so that the bed does not lose its solid particulate form. 12 claims, 1 drawing fig.

1240. Lundberg GA

LOCK, ESPECIALLY FOR A FIRE EXTINGUISHER

FRG Patent No. 2,551,029; Cl G05G 5/06, A62C 23/00, Appl 13 Nov 1975, Discl. 26 May 1977, Assignee: EJ Brooks Co, Newark, NJ

The invention relates to a lock for a device with a squeeze grip arranged on a grip mounting and with holes in the grip and mounting which line up when the grip is inoperative, characterized by a rigid pin so dimensioned that it sits in the holes, passes through the holes and projects to either side of the grip, a socket disposed at one end of the pin, and a flexible shackle extending from the other end of the pin, the shackle being a center section with a diameter smaller than that of the pin so that it can be slightly bent and exhibiting a number of locking beads having a diameter not greater than that of the pin, the shackle also being long enough to pass over the grip and be inserted in the socket, which contains a device to prevent release of the locking beads.



1241. Rago JJ

AUTOMATIC TELESCOPING SPRINKLER

FRG Patent No. 2,646,574; Cl A62C 37/10, Appl 15 Oct 1976, Discl. 18 May 1977, Priority: France, No. 7532763, Assignee: Inventor, Montmorency, France

The invention relates to an automatic telescoping sprinkler consisting of a fixed sprinkler head connected to a water line and a movable spray plate with a locking unit which is held in position against the axial pressure of the water or of a spring by a fusible device, distinctive in that the locking mechanism consists of a cylindrical slide valve and that a first part provided with a cylindrical outer surface is slidably disposed in the drill hole of a second part provided with transverse openings in such a way that both parts are mutually slidable, one of the two parts being connected to the sprinkler head and the other to the movable spray plate. 9 claims, 4 drawing figs.

1242. Purt G

IMPROVEMENTS IN FIRE EXTINGUISHING INSTALLATIONS

UK Patent No. 1,474,680; Cl A5A 14H, (A62C 35/22), Appl 12 Nov 1975, Discl. 25 May 1977, Priority: Switzer-

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

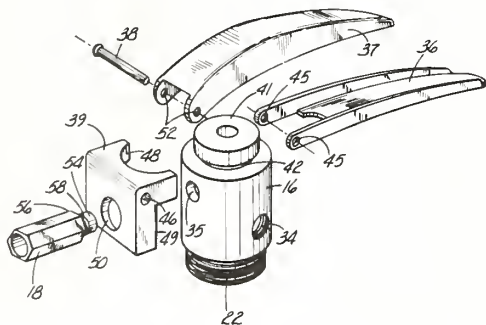
land, No. 16959/74, 19 Dec 1974, Assignee: Cerberus AG, Maennedorf, Switzerland

This invention concerns a fire-extinguishing installation with a number of fire sensors distributed within a space and, spatially coordinated with the sensors, distributor heads supplied with an extinguishant by way of a pipe system. The fire sensors are connected by electrical leads with a control apparatus arranged upon the response of a fire sensor to apply electrical signals to open control valves so that extinguishing medium is released from at least one of the distributor heads adjacent to the responsive fire sensor, while the distributor head coordinate with the responsive fire sensor remains inactive. 10 claims, 2 drawing figs. (Author)

1243. Allmendinger N
FIRE EXTINGUISHER

US Patent No. 4,019,584; Cl 169/74, (A62C 13/00), Appl 1 Dec 1975, Discl. 26 Apr 1977, Assignee: Richmond Industries, Inc, Willoughby, OH

A fire extinguisher is disclosed which is activated by operation of a unique valve and handle assembly. The handle of the fire extinguisher, which is to be utilized to operate the valve, is designed to simplify construction and assembly of the component parts in addition to simplifying recharging and servicing of the extinguisher. The handle is attached to the valve body through the use of only one rivet while being nonetheless permanently positioned with respect to the nozzle. The handle is further useful to simplify securing the nozzle to the valve body. 11 claims, 7 drawing figs. (Author)



1244. Davis RF
MODULAR FIRE PROTECTION SYSTEM

US Patent No. 4,013,128; Cl 169/61, (A62C 37/04), Appl 19 Apr 1976, Discl. 22 Mar 1977, Assignee: Walter Kidde and Co, Inc, Clifton, NJ

Disclosed is a fire protection system including a plurality of suppressor modules, each having a plurality of extinguishing agent filled suppressor units, an activator associated with each of the units and activatable by electrical current, a series circuit connecting the activators in series, and an initiator circuit for initiating electrical current flow to the activators. A detector responds to the presence of combustion products by activating the initiator circuits in a first plurality of the modules in a response relay that closes contacts to activate the initiator circuits

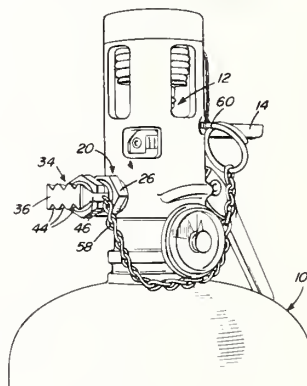
in another plurality of modules. This in turn energizes additional response relays to close contacts that activate the initiator circuits in an additional plurality of the modules. Sequential activation of the suppressor units in individual modules continues in this manner until all suppressor units in all modules of the system have been activated. 10 claims, 2 drawing figs. (Author)

1245. DePalma JS

DISPERSION NOZZLE WITH DISPERSION ELEMENT

US Patent No. 4,020,904; Cl 169/74, (A62C 13/24), Appl 3 Dec 1975, Discl. 3 May 1977, Assignee: Inventor, Closter, NJ

A nozzle construction including inlet and outlet ends is provided and the inlet end of the nozzle is adapted to be secured in the discharge port of a fire extinguisher. The outlet end of the nozzle is of a configuration designed to afford a stream-type discharge of any fire extinguishing material (dry chemical powder, liquid and/or pressurized gas) therefrom, whereby the fire extinguisher may be hand held and have the discharge from its nozzle directed toward the base of a fire to be extinguished. However, the nozzle is designed to be utilized on a heat sensing and automatic fire extinguisher of the wall type and the outlet end of the nozzle includes a discharge dispersion element removably supported therefrom and designed, when retained in position, to effect a wide dispersion of the stream of any fire extinguishing material being discharged through the nozzle. The purpose for widely dispersing the stream discharge of firefighting material from the fire extinguisher as a result of its automatic operation when wall mounted is to enable the discharge of the fire extinguisher to completely saturate a room area into which the fire extinguisher is automatically discharged and the purpose of the removal dispersion element being to enable removal of the latter for the purpose of manually fighting a localized fire. 2 claims, 4 drawing figs. (Author)



1246. Facchini E and Swanson CI
FIRE PROTECTION APPARATUS

US Patent No. 4,017,844; Cl 340/289, (G08B 25/00), Appl 14 Jul 1975, Discl. 12 Apr 1977, Assignee: Walter Kidde and Co, Inc, Clifton, NJ

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

The invention concerns a multi-zone fire protection system in which each protected zone is provided with a detector for producing an alarm signal in response to the presence of combustion products, a source of fire extinguishing agent, and a pull box station manually operable to induce discharge of the extinguishing agent into the protected zone. Each pull station possesses a signal lamp that can be energized to signal an abnormal condition to personnel present in the area. A signal lamp in a given zone is energized via a central control panel in response to an alarm signal from a detector associated with that zone, thereby clearly indicating to personnel at hand the specific zone in which a fire has been detected. 7 claims, 3 drawing figs.

1247. Fielding HC, Hutchinson J and Webster SJ

FIRE-FIGHTING FOAM COMPOSITIONS

US Patent No. 4,020,903; Cl 169/47, (A62B 1/12), Appl 15 May 1976, Discl. 3 May 1977, Priority: UK, Appl No. 50787/68, 25 Oct 1968, Assignee: Imperial Chem Industries Ltd, London, England

A method of fighting fires that comprises applying to the fire a foam produced from an aqueous composition comprising as a surface-active agent the residue of a branched oligomer of tetrafluoroethylene $(C_2F_4)_n$, where n is 4, 5, or 6 having a hydrophilic group attached to the residue of the oligomer, said oligomer having at least three CF_3 groups. The surfactants are particularly effective when incorporated in foams derived from other foam-producing materials. 2 claims, no drawing figs. (Author)

1248. Francioni A

CONSTRUCTION OF FIRE EXTINGUISHERS

US Patent No. 4,020,905; Cl 169/76, (A62C 35/50), Appl 8 Dec 1975, Discl. 3 May 1977, Priority: UK, No. 26405/75, 20 Jun 1975, Assignee: Inventor, Caracas, Venezuela

A simplified extinguisher achieves a constant and uniform ratio between the impelling gas charge and the extinguishing material charge by directing the impelling gas downwardly into the discharge outlet at a lower level of the extinguisher charge; and expansion space for the extinguisher charge being provided to allow a mixing of the two charges at the outlet. 4 claims, 1 drawing fig. (Author)

1249. Gangell DB

SPRINKLER SYSTEMS

US Patent No. 4,019,582; Cl 169/37, (A62C 37/08), Appl 7 Nov 1975, Discl. 26 Apr 1977, Priority: Australia, No. 820 79/75, 6 Dec 1975, Assignee: Environ Mech Services Pty, Ltd, Sydney, Australia

This invention relates to installation of fire sprinkler systems. In particular the present invention provides a means of installing such system before or after a ceiling has been fixed in a building. Essentially the present invention provides a water dropper pipe, a sprinkler attached to the dropper pipe and an escutcheon means. In effect, the present invention allows the sprinkler system to be installed at the most convenient time during the building operation. The escutcheon means being positioned over the sprinkler only after positioning on the ceiling such

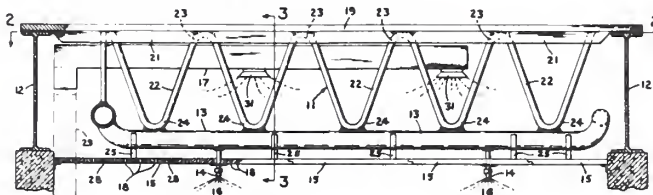
that the escutcheon means abuts against the ceiling, thereby covering the immediate area between the sprinkler and the ceiling. 20 claims, 8 drawing figs. (Author)

1250. Hirsch M

OVERHEAD STRUCTURAL, FIRE EXTINGUISHING AND VENTILATING SYSTEM

US Patent No. 4,012,875; Cl 56/168, (E04B 1/92), Appl 25 Feb 1976, Discl. 22 Mar 1977, Assignee: Active Fire Sprinkler Corp, Brooklyn, NY

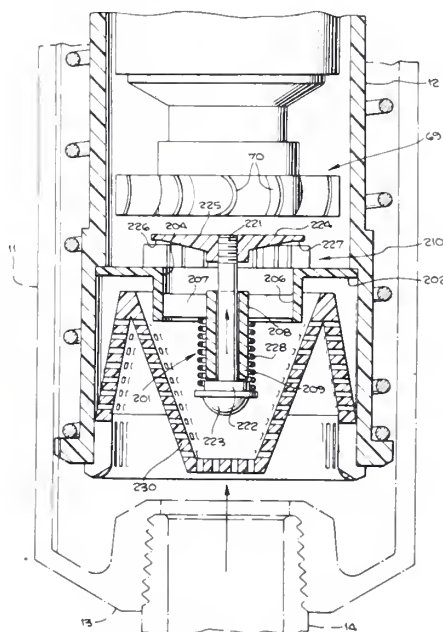
This disclosure pertains to a structural, fire extinguishing and ventilating system for use in building construction. Parallel joists have tubular lower chords through which fire extinguishing water is circulated and from which a perforated ceiling depends to form an upper enclosure for a room. Ventilating air ducts are positioned between the joists so that the ventilating air passes over the tubular lower chords in noncontact heat exchange relationship with the fire extinguisher water and the air then passes downward through the perforated ceiling to the room. 1 claim, 4 drawing figs. (Author)



1251. Hunter EJ

SPRINKLER SYSTEMS

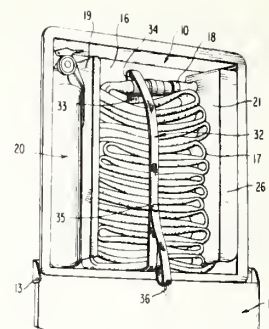
US Patent No. 4,026,471; Cl 239/206, (B05B 15/10), Appl 1 Apr 1976, Discl. 31 May 1977, Assignee: The Toro Co, San Marcos, CA



5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

Improvements in sprinkler systems having fluid under pressure flowing therethrough and a sprinkler head with a pop-up nozzle actuated by fluid pressure are disclosed. An impeller is actuated by the fluid flow to rotate the nozzle and thus rotate the spray of fluid therefrom. A transmission is disposed between the impeller and the nozzle for transmitting rotation of the impeller to the nozzle. Means are provided for regulating the rate of rotation of the impeller, and then the nozzle, under varying volume flow of fluid being sprayed thereout. This may be accomplished by a substantially constant velocity of incoming fluid impinging on impeller blades. This velocity may be maintained substantially constant by a variable resistance valve in association with a stationary stator having blades thereon, which valve moves with respect to the stator to provide a guided substantially constant velocity of jets of fluid on the impeller blades to rotate the same, which in turn rotates the nozzle at a substantially constant rate of rotation. 22 claims, 7 drawing figs. (Author)



1254. Sentinella VE
EXTINGUISHER MOUNTINGS

US Patent No. 4,013,255; Cl 248/313, (A62C 39/00), Appl 5 Sep 1975, Discl. 22 Mar 1977, Priority: UK, No. 11384/74, 18 Oct 1974, Assignee: Inventor, Caterham, England

A fire extinguisher mounting is disclosed in which the extinguisher is retained in a mounting frame by a pressure plate assembly actuated by an over-center mechanism. The over-center mechanism holds the extinguisher secure against vibration and the like and comprises a toggle arrangement actuated by a quick-release handle. The retaining forces act on the top and bottom of the extinguisher. 10 claims, 3 drawing figs. (Author)

1252. Owens RJ
BROMOTRIFLUOROMETHANE-CONTAINING FIRE EXTINGUISHING COMPOSITIONS

US Patent No. 4,014,799; Cl 252/8, (A62D 1/00), Appl 9 Apr 1975, Discl. 29 Mar 1977, Assignee: EI du Pont de Nemours and Co, Wilmington, DE

A relatively small amount of a volatile compound which is completely vaporized when applied to a fire and has a heat of combustion between about 8 to 13.5 kilocalories per gram is combined with bromotrifluoromethane for use in extinguishing fires of materials having heats of combustion between about 2.5 and 5 kilocalories per gram. 5 claims, no drawing figs. (Author)

1253. Schlegel HM
FIRE HOSE CABINET

US Patent No. 4,018,242; Cl 137/355.18, (A62C 35/20), Appl 1 Dec 1975, Discl. 19 Apr 1977, Assignee: Inventor, Ann Arbor, MI

A household fire hose cabinet employs a folded fire hose storage compartment bounded on one side by a stationary vertical partition and on the opposite side by a spring-urged hinged partition. The folded fire hose is retained in the storage compartment by a flexible strap harness having releasable snap fasteners. Releasing of the strap harness by pulling a terminal end thereof will forcefully remove the hose from the storage compartment and allow the spring-urged partition to swing to an open position in relation to a fire valve and operating handle which are normally enclosed between the hinged partition and the adjacent end wall of the cabinet. A storage compartment for a portable fire extinguisher is provided between the fixed partition and the other vertical wall of the cabinet. The forward open side of the cabinet is normally covered by a downwardly swinging hinged front closure which may be formed by a simulated painting. 8 claims, 8 drawing figs. (Author)

1255. Sigler EB
FIRE EXTINGUISHER ENCLOSURE

US Patent No. 4,017,133; Cl 312/293, (B65D 25/54), Appl 23 Feb 1976, Discl. 12 Apr 1977, Assignee: Inventor, Sioux Falls, SD

An enclosure is disclosed for a fire extinguisher or the like adapted to support and enclose completely a fire extinguisher, but having a front panel which can be torn out along defined lines so that the extinguisher can be removed and used. 5 claims, 2 drawing figs. (Author)

1256. Simons JR and Fenske JW
CONCEALED SPRINKLER HEAD

US Patent No. 4,015,665; Cl 169/40, (A62C 37/06), Appl 7 Aug 1975, Discl. 5 Apr 1977, Assignee: Gruman Co, Inc, Milwaukee, WI

An improved concealed sprinkler head for an automatic sprinkler system is disclosed. The sprinkler head includes an orifice body that is mounted above the ceiling of the building and is connected to the water line. The body has an outlet which is normally enclosed by a valve cap, and the cap is held in the closed position by a latch assembly which includes a latch bar. One end of the latch bar is provided with a projection which engages an abutment on the orifice body while the opposite end of the latch bar is provided with a recess which contains a fusible metallic element, and a movable member, such as a ball or a series of balls, is engaged with the fusible element and projects outwardly from the latch bar and is engaged with a second abutment on the orifice body.

5. FIRE PROTECTION OF STRUCTURES

d. Extinguishing Agents, Additives, and Equipment—Continued

The latch bar carries a decorative plate that is mounted flush against the ceiling and has a series of openings to provide improved heat transfer to the fusible element. When exposed to an elevated temperature, the fusible element will melt and spring pressure will force the movable member inwardly of the recess to release the latch bar and open the valve cap. 3 claims, 7 drawing figs.

1257. Agafonov VV and Baratov AN

POWDER COMPOSITION FOR EXTINGUISHING ALKALI METALS

USSR Patent No. 544,437; Cl A62C 1/00, A62C 3/06, Appl 30 Jan 1975, Discl. 30 Jan 1977, Assignee: All-Union Fire Research Institute

The invention relates to the production of powder compositions for fire extinguishment and can be used to extinguish burning metals, in particular alkali metals. The aim of the invention is to increase the extinguishing effect of the powder, which is achieved by a composition containing soda ash (87.1–94.3 weight %), stearic acid (0.5–0.6), aluminum stearate (0.9–1.0), iron or magnesium stearate (0.9–1.0), graphite (0.9–1.0), sulfur (1.5–6.5), and polyethylene (1.0–2.5).

1258. Isaev MN and Vasil'ev AD

APPARATUS FOR FOAM EXTINGUISHMENT OF FIRES

USSR Patent No. 548,280; Cl A62C 5/04, Appl 1 Jul 1975, Discl. 28 Feb 1977, Assignee: All-Union Fire Research Institute

The invention relates to firefighting equipment, in particular to extinguishing means using medium-expansion foam. The apparatus contains a sprayer and two mesh elements made in the form of hollow cylinders arranged concentrically relative to each other and fastened together by brackets and clamps, the height of the inner cylinder being less than that of the outer cylinder by 25–40%. Both ends of the mesh elements are open. 1 drawing fig.

1259. Richards RC

EVALUATION OF NOZZLES TO BE USED WITH AFFF AND THE COAST GUARD IN-LINE PROPORTIONER.

Coast Guard Res and Dev Center, Groton, CT; CGR/DC-4/77, USCG-D-26-77, 51 pages, May 1977
Availability: NTIS AD-A042 745/0GA

Evaluative, fire extinguishment and burnback tests were conducted at the USCG Fire and Safety Test Facility, Mobile, Alabama, to determine the optimum nozzle to be used with the CG-6LP proportioner and Aqueous Film Forming Foam (AFFF). Commercially available water fog nozzles were compared to the mechanical foam nozzle and the Navy all purpose nozzle currently in use on Coast Guard cutters. The water fog nozzles produced the best range and offered more versatility in the patterns they produced. The best two water fog nozzles and the mechanical foam nozzles were able to control a 660 sq ft JP-5 deck fire in less than 25 seconds. (Author)

1260. Gann RG

AUTOMATED FIRE-INERTING SYSTEM.

Dept of Navy, Washington, DC; AD-D004 000/6, 16 pages, Apr 1977
Availability: NTIS PAT-APPL-790 105/GA

An automatic fire-inerting system utilizes a fire-inerting agent in an enclosed area to prevent a fire while allowing human habitability. The system comprises an analyzer for continuously monitoring the concentration of the agent and initiating a timed sequence when the concentration of the agent rises above or falls below a given level, a solenoid valve for releasing the agent upon analyzer instruction, and an over-level relay for initiating rapid ventilation of the compartment upon analyzer instruction. (Author)

1261. Hayes WD, Jr and Custer RLP

INVESTIGATION OF THE SUITABILITY OF LIGHT-DUTY PIPE HANGERS FOR USE IN RESIDENTIAL AND CARE TYPE SPRINKLER SYSTEMS.

Nat Bureau Standards, Inst Appl Technol, Center for Fire Res, Washington, DC; NBSIR 77-1282, 39 pages, 11 figs, 7 tables, 18 refs, Oct 1977

Availability: NTIS PB-273 575/1GA

Several sizes of various types of commonly available light duty hangers for pipe, cable and conduit were subjected to load failure tests and while under load to exposure to 70 to 140 pound (31.8 and 63.5 kg, respectively) crib fires. In addition, hangers made from thin strap metal were tested for effect on performance of undersized screws and for benefit obtained from the use of washers. All sizes of the two-hole or two-fastener hangers met the NFPA No. 13 Standard for the Installation of Sprinklers load requirement, while only the nominal 1-1/4 in. size of the one-hole hangers met the requirement. Washers improve the performance of hangers made of thin strap metal. (Author)

1262. Liu ST

ANALYTICAL AND EXPERIMENTAL STUDY OF EVAPORATIVE COOLING AND ROOM FIRE SUPPRESSION BY CORRIDOR SPRINKLER SYSTEM.

Nat Bureau Standards, Inst Appl Technol, Center for Fire Res, Washington, DC; NBSIR 77-1287, 51 pages, 24 figs, 1 table, 12 refs

Availability: NTIS PB-273 576/9GA

Investigations, both theoretical and experimental, are conducted to evaluate the effects of a corridor sprinkler system on the cooling and suppression of a fire in an adjacent compartment connected by an open doorway. A simplified one-dimensional mathematical model is presented to predict the net reduction of the corridor ceiling hot gas temperature by evaporative cooling. Scaling criteria based on the analysis of the motion of an evaporating droplet were developed for the correlation of full-scale and small-scale experimental results and the design requirements of a small-scale experiment. Representative test results from full-scale and one-quarter scale model experiments are presented. These tests demonstrate the effectiveness of water spray in reducing the corridor hot gas temperature to a level low enough for safe passage, and in causing a strong recirculating flow at the room doorway. This flow reduces the oxygen content around the fire significantly, and results in a much reduced burning rate of the fuel. The effect of the spray droplet size on the cooling and on fire suppression is discussed. (Author)

5. FIRE PROTECTION OF STRUCTURES

e. FIRE LOADS AND HEAT EFFECTS ON STRUCTURES

1263. Turkov AS and Demskiy VG

METHODOLOGY FOR DETERMINING AND CLASSIFYING THE THERMAL REGIME OF A FIRE IN INDUSTRIAL BUILDINGS [Metodika Opredeleniya i Klassifikatsiya Teplovogo Rezhima Pozhara Pomescheniy Proizvodstvennykh Zdaniy]
VNIPO, Moscow, USSR; 1st edit, 14 pages, 1976 (Russian)

The methodology described in this pamphlet is designed as a means for determining and classifying the thermal regime of a fire in various projected and actual industrial premises. By thermal regime is meant the thermal stress of the premise and the intensity of the heat release. The thermal regime of a premise should be determined in accordance with part 3 of this methodology. The thermal regime is determined within the confines of a premise or fire zone without regard to the fire-hazard category of the production process. 1 fig, 4 tables. (Author)

1264. Alvares NJ [Stanford Res Inst]

FIRE ENDURANCE OF SOLDERED COPPER SPRINKLER SYSTEMS. PART II
Fire Technol; 13(4):282-295, 315, 1977

Soldered copper tube fitting systems were exposed to a variety of extreme fire environments in a systematic way. The thermal response of joints was related to the full-scale actuation time of fusible link sprinklers. Tests were conducted for both horizontal and vertical arrays and for wet- and dry-pipe conditions. The results show that the joints retain their integrity over a wide range of conditions. For 95% tin - 5% antimony and 50% tin - 50% lead soldering alloys, in all dry-pipe tests, sprinklers of a scaled distance of 6.25 ft from the coupling position (corresponding to a full-scale distance of 20 ft from the source fire) fused before the solder melted. 7 figs, 5 tables, 6 refs. (NFPA)

1265. Barthelemy R

ALLOWANCE FOR REAL FIRE CONDITIONS WHEN DETERMINING THE FIRE RESISTANCE OF BUILDING FRAMES AS APPLICABLE TO METAL CONSTRUCTION
Rev Tech Feu; 18(165):36-37, 39, 1977 (French)

The fire resistance of metallic components of buildings and structures is determined in France by the existing standards based on the temperature regime as established by the standard curve. Tests conducted under real fire conditions show, however, that the "temperature-time" curves characterizing the temperature regime under these conditions differ substantially from the standard curve. This difference consists primarily in a constant increase in the standard curve, while the temperature curve under real fire conditions is characterized by an abrupt decrease after a brief but appreciable increase in temperature, the result being that the temperature in a given premise decreases by a factor of approximately 2 in comparison with the maximum temperature from the standard curve. Metallic structural components, therefore, are subjected to lower temperatures owing to the thermal inertia of the structures and the briefness of exposure to high tem-

peratures. Formulas are given for determining the temperatures reached in premises based on the heat balance, and also formulas for determining the degree of heating of unprotected and protected metal structures over specific time intervals. This method can be used in practice only if data on the magnitude of the fire load in a given building or premise are known. 2 figs, 12 refs. (RZh)

1266. Schneider U and Haksever A

DETERMINING THE EQUIVALENT FIRE ENDURANCE OF STATICALLY DETERMINED REINFORCED-CONCRETE BEAMS IN REAL FIRES (CONTRIBUTION TO THE COMPUTATIONAL METHOD OF STANDARD DIN 18 230 E). Inst fuer Baustoffkunde u. Stahlbetonbau, Braunschweig, FRG; Unnumbered, 60 pages, 41 figs, 12 tables, 16 refs, 1976

Availability: Fachdok 13/0866

Three methods for the fire-safety assessment of load-bearing building components are described and discussed. In addition to the standard fire test, direct and indirect assessment methods are presented which, in contrast to the standard fire, take the actual fire conditions into account. The advantages of the indirect method are pointed out, with particular emphasis on questions involving the comparability of fires of different intensity and the possibility of determining and evaluating fire effects by measurement techniques.

f. FIRE PREVENTION AND HAZARD REDUCTION

1267. Fukushima T

AUTOMATIC FIRE PROTECTION DEVICES FOR INDUSTRIAL SYSTEMS
Kagaku Kojo; 21(1):42-46, 1977 (Japanese)

The design and operating principle of different models of automatic devices used in Japan for the protection of industrial systems against fire and explosion are described. The automatic protection device for exothermal reactors, for instance, makes it possible to stop a production cycle when the reaction temperature increases to a prescribed limit and, consequently, to prevent the hazard of fire outbreak. The automatic reaction monitoring system initiates and terminates the supply of components into a solution and also turns off the reactor during emergencies. The operation and methods of perfecting (to increase reliability) various automatic inhibiting devices triggered when the level of a combustible fluid exceeds a permissible value are analyzed. For this purpose, the operation of an automatic device that inhibits the supply of paint and varnish fluids from the production shops through a pipeline to storage tanks is examined. The device consists of a level regulator, a level gage sensor, an electro-contact monometer, and a magnetic trigger. The space sensors of the level gage are arranged in the tanks at the desired limit level. When the level reaches the sensitive component of the space sensor, a pulse is transmitted to the regulator, a valve along the pipeline closes off the cross-section of the line, and the finished product stops flowing into the tank. Also examined are variants of the most reliable electrical circuits for control of the automatic protection device. Recommendations are presented as to the use of such solid-state integrated microcircuits in such control systems. 4 figs, 3 tables, 9 refs. (RZh)

5. FIRE PROTECTION OF STRUCTURES

f. Fire Prevention and Hazard Reduction—Continued

1268. Otake S

APPARATUS FOR MONITORING OIL LEAKS*Kagaku Kojo*; 21(1):47-51, 1977 (Japanese)

Described is the design, circuit, and operating principle of a semi-automatic system for indirect detection of leakage of liquid petroleum products from fixed closed tanks in enclosed tank farms. The operating principle of the system is based on determination of the concentration of hydrocarbon gases near surfaces over which a petroleum product leaking from a tank (or pipelines) may spread. The system includes a central unit for analysis of the agent and a set of stainless-steel sampling pipes. By means of a special pump that creates small constant rarefaction in the pipes, the gas medium is continuously pumped through the detector chamber of the central unit. The detector chamber contains a catalyst in the form of an activated platinum coil heated to a high temperature. The hydrocarbon vapors in the medium being analyzed (if petroleum products are leaking) ignite when they come in contact with the incandescent coil. The resultant infrared radiation is recorded by a photocell, which is also in the detector chamber. The strength of the IR radiation, and therefore of the electrical signal at the output of the photocell, is proportional to the quantity of burning petroleum-product vapors. The electrical signal from the photocell output passes to a galvanometric instrument with a scale graduated in units of hydrocarbon vapor concentration. Connected to one galvanometer are several detectors whose signals are transmitted in succession to the input of the instrument through an electronic commutator. If required, the operator can reduce the number of monitoring points around the tank. 9 figs, 1 table. (RZh)

1269. Nakagawa T

EXPLOSION PROTECTION SYSTEMS FOR CHEMICAL ENTERPRISES*Kagaku Kojo*; 21(1):57-60, 1977 (Japanese)

Title only available.

1270. Colome J, Duchene A and Regnier J

APPARATUS FOR FIRE EXTINGUISHMENT BY ISOLATING A COMBUSTIBLE LIQUID*French Patent No. 2,319,392*; Cl A62C 3/12; G21C 9/04, Appl 31 Jul 1975, Discl. 25 Feb 1977, Assignee: Commissariat à l'Energie Atomique, France

The patent relates to an apparatus for fire extinguishment by isolating a combustible liquid, novel in that it comprises a lower receptacle to receive the combustible liquid and an upper cover closing the receptacle, the cover consisting of inclined channels to collect the flow of combustible fluid and openings at the bottom of the channels for the fluid to pass into the receptacle, the openings being stopped by retractable shutters which are displaced by the pressure of the liquid on the channels and close automatically after the liquid has flowed into the receptacle. The receptacle is designed as a fireproof container to protect the combustible fluid. 10 claims, 4 drawing figs.

g. PRESSURE EFFECTS ON STRUCTURES

h. PROTECTIVE COMPONENTS AND CONTROL SYSTEMS

1271. Kodama T

FIRE SAFETY SYSTEM FOR VARIOUS TYPES OF BUILDINGS*Denryoku to Tetsudo*; 27(2):10-14, 1977 (Japanese)

A detailed description is given of the design and operating principle of a complex automatic fire safety system which includes a fire detection and extinguishing subsystem and is designed for use in buildings of varying shape and purpose. The system equipment is highly compact because wide use has been made of solid-state integrated circuits in the electronic units of the monitoring and measuring, control and communications apparatus. The system equipment is also characterized by man-machine compatibility factors because finishing materials and decorative components have been used, so that the detectors, sprinkler heads, alarm devices (visual and acoustic) and other components have been arranged without detriment to the appearance of the building interior. A particular feature of the communications subsystem, which is also part of the complex fire safety system, is an automatic radio transmitter and a roof-mounted whip antenna for emergency radio communication with the municipal fire service. The radio channel is an auxiliary means, the main one being a telephone alarm channel, but improves the reliability of communications to a considerable degree. 10 figs. (RZh)

1272. Nakamura M

DISASTER PREVENTION SYSTEM OF THE HQ BUILDING OF THE TOKYO METROPOLITAN FIRE DEFENSE AGENCY*Densetsu Kogyo*; 23(3):1-14, 1977 (Japanese)

The design, operating principle and main parameters of the fire equipment for the 14-story building of the Tokyo Fire Defense Agency are described. The building is one of the principal communication centers of the national fire defense information and control network, and therefore contains a concentration of a large number of various types of computers, self-contained memory stores on magnetic tape, disks and drums, as well as transmitting-receiving radiotelegraph, radiotelephone and telephone apparatus, display panels, semiautomatic data input and output devices, and other organizational automatic systems. The high concentration of computer and radio-communications equipment, which typically require appreciable amounts of current, imposes increased requirements on the effectiveness of the fire equipment being used. The particular feature of the fire safety system, which was specially tailored for this building, is the way it was integrated with a centralized operator-handled or automatic control system. The integrated system includes individual fire detection and extinguishing subsystems for different purposes. A detailed description is given of the automated system for the delivery of carbon dioxide extinguishant to the main equipment hall of the building computer center. Next to the equipment hall is an enclosure where the CO₂ cylinders are kept. The cylinders are arranged in several rows, those of one row being connected to an appropriate collector and equipped with a cable system for opening the set. 6 figs, 3 tables. (RZh)

5. FIRE PROTECTION OF STRUCTURES

h. Protective Components and Control Systems—Continued

1273. Barnard HD, Gilbreth EW [Phillips Petroleum Ltd, UK] and Murhall CC
THE DEVELOPMENT OF A SUPERIOR FORM OF FIRE PROTECTIVE CLADDING FOR QUARTERS AT EKOFISK, NORWEGIAN NORTH SEA
Fire; 70(Suppl):38-39, 1977

To meet the conditions of offshore platform quarters capable of withstanding high, intense thermal shocks, continually high radiant heat levels, and the corrosive effects of convective heat fluxes, a special heat-shield wall was devised and similar types of high-grade barriers were designed for the roof and skid. Durasteel was to resist the thermal shock and Isolamin to limit the heat transfer between the Durasteel and the accommodation structure. Assembly of the sandwich panels, construction of the accommodation packages, fire tests on the component materials and on mockups of assembled heat shield wall panels, observations, and test conclusions are described and examined. (This article is extracted from a paper presented at the annual conference of the Institution of Fire Engineers (UK) held at Brighton on 28-29 September, 1977.)

1274. Anon
FIRE PROTECTION EQUIPMENT AND SYSTEMS FOR OFFSHORE INSTALLATIONS
Fire Prot Rev; 40(445):16-17, 1977

On drilling or production platforms, areas requiring a different firefighting medium will overlap, and therefore the selection of the detection and firefighting systems is more difficult. The fire detection system should be capable of detecting a fire anywhere on the installation and indicating its location at the main control point. Gas detection is also vital and should indicate the presence of gas at two levels of alarm before the lower explosion limit on the central control panel with audio/visual alarm and emergency operation procedures initiated at the higher limit. Control equipment must be able to differentiate between "fire" and "fault" conditions. Selection of the correct firefighting medium for the particular risk is very important. The fire protection equipment for two major pipeline terminals, one step beyond the protection of offshore installations, is also described, in particular, the protection of floating-roof oil storage tanks, remote-control foam/water monitors and firefighting vehicles. 1 photo.

1275. Doi K
DEVELOPING AN INVENTORY OF EMERGENCY DIESEL ELECTRICAL POWER SOURCES FOR FIRE EQUIPMENT
Kuki Tyowa to Reito; 17(1):140-147, 1977 (Japanese)

It is reported that Japanese industry is producing a broad range of different types of principal and auxiliary fire equipment, including equipment designed for use in highrise and multi-story buildings and other large premises requiring increased fire protection. All this equipment is narrowly specialized, ie, it is developed for application to predetermined operating conditions, particularly in fire situations. But none of it is applicable to emergency electrical power sources designed to ensure operation of fire detection, extinguishing and venting systems in case of failure of the line voltage. Such a situation represents

an appreciable deficiency, because the power sources usually used (among them various kinds of accumulators, batteries, gas-driven electric generators, diesel-fueled electrical generators, and the like) produced by the electrotechnical industry for various spheres of application, are designed, as a rule, for operation in a narrow range of parameters of the ambient medium. For instance, the mass-produced diesel-fueled electrical generators of the Denyo KK Company (Tokyo), which are used in complex automated fire safety systems for highrise buildings, are designed to operate at an atmospheric pressure of 760 mm Hg, an ambient temperature of 20°C and 65% humidity. If a fire spreads into the area where these power sources are located, they are threatened with failure, resulting in de-energization of the fire safety equipment. Information is given on the leading developments of this company in the creation of a broad range of diesel-fueled electrical generators, several models of the new equipment being considered especially for operation in combination with fixed fire safety systems and devices. A method is presented for calculation of the technical parameters of generators, taking into account the requirements of maintaining operational capability in high-temperature conditions. 2 figs, 7 tables.

1276. Hiramato M
SYSTEMS USE OF FIRE EQUIPMENT IN LARGE BUILDINGS AND THE INTRODUCTION OF COMPUTERS
Kuki Tyowa to Reito; 17(1):86-91, 1977 (Japanese)

The advantages and disadvantages of combining the fire equipment of multi-story buildings into systems are assessed. One of the advantages of such complex automated fire detection and extinguishing systems is the possibility of centralizing the functions of control and supervision of the operating status of individual system components. A trend toward the use of computers, either serviced by an operator or automatic, as the supervisory and control units of such systems, has been noted recently. The use of a computer greatly enhances the overall technical level of the fire safety systems, but sometimes the use of a computer is not economically justified, since the demand on the computer's operational capacities is too low. To eliminate this deficiency it is proposed to develop and introduce subscriber-type central fire safety system control stations equipped with modern high-capacity computers and serving not one fire warning and extinguishing system in one building, but a certain number of such buildings, each having its individual fire safety. Such subscriber stations could be organized on a regional basis and combined into a computer-based network. The establishment of networks will appreciably reduce the number of control computers needed. Some potential versions of fire control networks are examined. The main requirements for computers to be used in such systems are formulated. 3 figs, 4 tables, 3 refs. (RZh)

1277. Nakahara N
DEVELOPMENT OF AUTOMATIC FIRE VENTILATION SYSTEMS
Kuki Tyowa to Reito; 17(1):80-85, 1977 (Japanese)

An analysis is made of some problematical aspects of the development and operation of complex systems of emergency air-handling and smoke-removal ventilation

5. FIRE PROTECTION OF STRUCTURES

h. Protective Components and Control Systems—Continued

designed for installation in multi-story buildings and other large premises with a large number of compartments. It is pointed out that the use of such systems has sometime led to negative results; in particular, activation of a powerful ventilation system has led to intense development of the fire. In order to prevent such cases the system should be provided with a flexible control program which regulates the ventilation mode and the position of the dampers of the smoke-removal and venting ducts in compartments in accordance with where the fire has broken out. This problem is solved by using a computer as the principal control element in the fire safety system. The computer memory must be fed data on all possible variants of the location of the seat of a fire and appropriate optimal control algorithms of the fire ventilation system. Block diagrams and the operating principle of such computer-controlled systems are considered. 9 figs. (RZh)

1278. Umenushi Y, Yoshitsuka T, Fujioka S and Yamamori K
USE OF COMPUTERS FOR THE CONTROL OF FIRE SAFETY SYSTEMS IN MULTI-STORY BUILDINGS
Kuki Tyowa to Reito; 17(1):92-97, 1977 (Japanese)

An analysis is made of the possibility of further increasing the effectiveness of complex automated fire safety systems installed in multi-story buildings and other large premises by fully transferring the functions of control and supervision of the equipment status of such systems to computers. A description is given of the block diagram and operating principle of some existing fire safety systems with monitoring and control functions partially handled by various types of computers (in most cases small processors). The main features and problematical aspects connected with the design, development, installation and operation of such systems are discussed. Also examined are the block diagrams and operating principles of an ideal fire safety system that uses a multi-functional computer as the principal component and is designed for use without a human operator. A description is given of programs developed for the automatic performance of the two main computer functions: determining the fire status of the protected premise at all times and diagnosing the technical status of the fire alarm and extinguishing equipment comprising a complex system. The problems of optimal structure and mathematical manipulation of such a control computer are discussed. It is pointed out that for this purpose it is expedient to use a universal analog-digital computer with a rigid program equipped with a well-developed interface system, an external magnetic drum memory, and display scopes with automatic recording. 6 figs, 2 tables. (RZh)

1279. Bosquet J
THERMAL INSULATION
Rev Tech Feu; 18(165):12-16, 18-20, 25-29, 1977 (French)

Thermal insulation is defined and a review is given of fire-resistant coverings. The thermal conductivity of a broad range of materials is given, also for interior walls. The obligation for thermal insulation is defined in accordance with seven classes and three zones. Also defined are insulating materials, in general and in particular; their coefficients are compiled in tables. The manner in which insulating materials behave in fire is shown in terms of material and composition. Information on fire-resistant in-

terior walls, glass doors, glass walls, etc., is required. Coverings of polyurethane, relevant standards, classification into heavy, medium and light materials, and critiques of fires in thermally insulated buildings are discussed. 13 figs, 13 tables. (Fachdok 13/0958)

1280. Hayashi T
STUDY OF SCREEN FLAME ARRESTERS
Sangyo Anzen Kenkyushu Gijyutsu Shiryo; (4):1-8, 1976 (Japanese)

The methods and results of studies of metal screens of varying configuration for use as the principal components of industrial flame arresters in oil and gas lines are described. The various designs differ from each other in screen and mesh diameter, number of screens in the set, distance between screens in the set and other parameters. 8 figs, 5 tables, 3 refs.

1281. Inoue Y and Sasaki Y [*Takenaka Komuten Co Ltd, Osaka, Japan*]
FIRE PREVENTION SURVEILLANCE CONTROL SYSTEM EMPLOYING MICRO-COMPUTERS — ALAMOS-T
Takenaka Tech Res Rep; (17):175-187, 1977 (Japanese; English Summary and Captions)

The overall trend in building fire prevention is toward increasingly diverse and complex facilities and toward a marked increase in the number of control units owing to improvements in firefighting legislation and building standards. In terms of surveillance and control, it is necessary to process and evaluate a large amount of information in order to issue precise control instructions to a system of fire prevention appliances and, at the same time, to ensure remote surveillance of the information of the control operation. In order to satisfy these demands fully, the ALAMOS-T system has introduced a micro-computer for the control unit to establish an integrated fire prevention surveillance control system owing to the micro-computers' high level of control, high reliability, durability and low cost, and skillful combination of hardware and software techniques. The hardware and software are well defined through the introduction of the micro-computer. Since the software can handle system modifications, flexibility is ensured. 12 tables. (Author)

1282. Seeger PG and John R [*Univ Karlsruhe, FRG, Fire Safety Engineering Res Center*]
SMOKE CLEARANCE IN AN INTERIOR STAIRWELL BY MEANS OF A PRESSURIZATION SYSTEM
VFDB Z; 26(3):77-86, 1977 (German; English and French Summaries)

The operational performance and output of a pressurization system installed in an eight-story office building in Hamburg (FRG) was investigated to determine whether penetration of smoke into the vestibules and the interior stairwell is sufficiently prevented to permit unimpeded use of the escape routes in case of fire. A cold-smoke and a real fire test were conducted. Evaluation of the results of the fire test showed that about 14.5 min into and up to the end of the test, only small quantities of smoke gas penetrated into the vestibule, while the stairwell was completely free of smoke gases during the entire duration of the test. It is concluded that the limit of

5. FIRE PROTECTION OF STRUCTURES

h. Protective Components and Control Systems—Continued

performance of the pressurization system installed in this building is reached after 15 min in this test. Estimates of the effectiveness of this pressurization system with greater fire loads and other room divisions lead to the conclusion that certain protection against penetrating smoke gases is not guaranteed in case of fire. 15 figs, 2 tables, 5 refs. (Author)

1283. Deutsche Metalltueren-Werke

SLIDING FIRE DOOR

Belgian Patent No. 825,407; Cl A62C, E05F, Appl 11 Feb 1975, Discl. 2 Aug 1977, Priority: FRG, No. 7,400,699, 10 Jan 1974, Assignee: Deutsche Metalltueren-Werke Aug Schwarze AG, FRG

The invention relates to a sliding fire-check door comprising, in order to break the force on closing the door, a shock-absorbing or hydraulic or pneumatic braking cylinder mounted for axial control on the upper guiderail of the door, the piston rod projecting outside the cylinder, being provided with a permanent magnet head. Between this magnet head and the housing of the cylinder the braking cylinder supports a stopper of rubber enclosing the piston rod, a thrust stop, which cooperates with the magnetic head when the door is opened and closed, being also disposed in the area of the upper closing edge of the door.

1284. Eberspacher J

SMOKE AND HEAT REMOVAL APPARATUS

Belgian Patent No. 824,500; Cl A62C, E04D, Appl 17 Jan 1975, Discl. 17 Jun 1977, Priority: FRG, No. P 24 02 312.9, 18 Jan 1974, Assignee: Inventor, Easlingen-Neckar, FRG

This invention concerns a smoke and heat removal apparatus for roofs, consisting of a frame fixed to the roof surrounding the opening in the roof, with upright walls and at least one covering piece overlapping the frame. The covering pieces are supported rotatively, the center of the rotation being located in the walls offset from the center of gravity of the respective covering piece. The individual covering pieces are joined when closed by means of a lock and are held in place after being fully closed.

1285. Grescha-Ges (Co)

METHOD AND APPARATUS FOR REMOTE ACTUATION OF A SMOKE AND HEAT REMOVAL INSTALLATION

Belgian Patent No. 825,749; Cl A62C, E05F, Appl 20 Feb 1975, Discl. 2 Aug 1977, Priority: FRG, No. P 24 59 525.3, 17 Dec 1974, Assignee: Grescha-Gesellschaft Grete u. Scharf, FRG

The invention presents apparatus for remote actuation of shutters, such as traps, doors, etc., in smoke and heat removal installations, eg, automatic opening of shutters, such as skylight shutters of a building or hall, in which the shutter is actuated by a lift, eg, a cylinder and piston assembly operated by a pressurized agent, while it is closed by an elastic component. The lift assembly is provided with a control unit whose piston can be acted upon alternately by a pressurized agent issuing from one source and another agent from another source, the control piston acting as a check for the elastic system which, when the control piston is actuated, releases it.

1286. Strulik WP and Mealares C

FLAME-ARRESTING OR SMOKE-REMOVAL VALVE APPARATUS

Belgian Patent No. 824,714; Cl A62C, E04F, Appl 23 Jan 1975, Discl. 17 Jun 1977, Priority: France, No. 74/04 607, Assignee: Inventors

For a description of this patent see abstract 378 in FTA 2(1/2) (US Patent No. 3,981,317).

1287. Bogaert PEEJ

IMPROVEMENTS TO DEVICES FOR OPENING SMOKE AND HEAT VENTS

French Patent No. 2,318,296; Cl E05F 1/08; A62C 3/14; E05F 15/20; F16K 17/38, Appl 18 Nov 1975, Discl. 18 Mar 1977, Priority: Belgium, No. 158.465, 18 Jul 1975, Assignee: Inventor

The present invention relates to improvements to devices for opening smoke and heat vents, used primarily in conjunction with a fusible vent retainer, as well as various smoke and heat detectors, automatically opening the vents in case of fire. This powerful, compact, self-contained device is designed to open a smoke and heat vent; it is interposed between the fixed and moving portions of the frame by means of a fixed arm forming a support and a pivoting arm, the opening force being transmitted to the moving portion by means of a hinge attached to a link sliding in the pivoting arm, the latter being held in the closed position by means of a swiveling panel controlled by various traction means, among them a swiveling lever held in the retention position by an electromagnet, all the forces and tensions being totally retrieved in the self-contained device and working in vertical, parallel and closely related planes. 10 claims, 12 drawing figs.

1288. Pantland FW and Pantland EF

FIRE-PROOF REGISTER

French Patent No. 2,317,949; Cl A62C 3/14; E04F 17/04, Appl 16 Jul 1976, Discl. 18 Mar 1977, Priority: South Africa, No. 75/4.627, 18 Jul 1975, Assignee: Fisher, LJ, Republic of South Africa

A patent is disclosed for a fireproof register and its control unit to be used in air-handling systems. According to the invention, the register comprises an opening and at least one pivoting shutter to block or free the opening. In addition, it has a drive motor, a drive transmission link controlled by the motor, one of the components of the link system being fusible, while one end of the link is connected to the shutter, the motor being adapted so as to be set in operation by a suitable energy source to keep the shutter open when the fusible element is intact and close it when the fusible element is ruptured. 10 claims, 1 drawing fig.

1289. Berger F and Hilzensauer V

FIRE DOOR

Swiss Patent No. 585,849; Cl E06B 5/16, Appl 28 Jun 1974, Discl. 15 Mar 1977, Priority: Austria, No. 6512/73, 24 Jul 1974, Assignee: Sax-Werke August Sachseneder GmbH, Austria

The invention concerns a fire door with a door panel which contains a one- or multi-component framelike portion made of wood or plastic containing a recess into

5. FIRE PROTECTION OF STRUCTURES

h. Protective Components and Control Systems—Continued

which a sheet of fire-resistive insulating material can be introduced, distinctive in that metal guide strips are disposed at at least the two vertical insides of the framelike portion to prevent warping as a result of thermal expansion. 5 claims, 2 drawing figs. (Author)

1290. Kienle R, Linke H and Kraemling F
LAMINATED HEAT-RESISTANT BUILDING COMPONENT

Swiss Patent No. 584,324; CI E04B 1/94, E04C 1/42, Appl 17 Jan 1975, Discl. 31 Jan 1977, Priority: FRG, No. 2,403,537, 21 Jan 1974, Assignee: Bruestungselemente GmbH, Cologne, FRG

A patent is disclosed for a laminated, heat-resistant building component designed as an area closure, consisting of a pane of prestressed glass, a core layer made of heat-retarding material, and another rigid plate on the other side of the core layer, the layers being joined together with a heat-resistant cement, distinctive in that a metal wire mesh is disposed in the cement layer connecting the prestressed glass layer and the heat-retarding core layer. 8 claims, 1 drawing fig. (Author)

1291. Nonaka M
CONTROL INSTALLATION FOR PUBLIC TRANSMISSION OF ALARMS BY WIRE

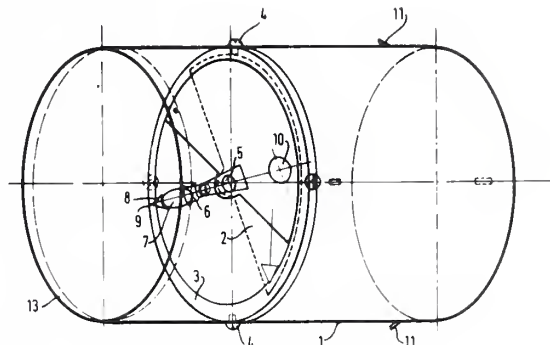
Swiss Patent No. 587,528; CI G08B 3/10, 9/00, H04B 3/50, Appl 6 Feb 1974, Discl. 13 May 1977, Priority: Japan, No. 48-69143, 21 Jun 1973, Assignee: Hochiki KK, Tokyo, Japan

The aim of the invention is to permit remote control of apparatus by means of the public address system. According to the invention the control system comprises a transmitter with a control signal generator and a microphone, the transmitter assembly being connected by transmission cable to the electro-acoustic transducer of a receiver assembly, which is associated with a device responding to control signals and performing certain functions in response to these signals, distinctive in that the control signals are longer and have a greater amplitude than the voice signals delivered through the microphone, and in that at least one switch is provided for selective connection to the transmission cable of either the microphone or the control signal generator assembly, and in that the device responding to the control signals is sensitive to both the amplitude and length of the control signals. 5 claims, 1 drawing fig.

1292. Schade MG
VENTILATION VALVE

Swiss Patent No. 587,432; CI F16K 3/06, A62C 3/14, Appl 23 Oct 1974, Discl. 29 Apr 1977, Assignee: Inventor

The object of this invention is a ventilation valve which, by reason of its less costly structure, can be used both in ventilation ducts leading to individual rooms and in large fire safety systems, can be monitored with little cost, and which is functionally safe at any time, providing an optimal seal without additional means. According to the invention, the valve is a semicircular disk, centrally disposed in an annulus and readily rotatable, the latch member being rotatably fixed with the disk, the annulus having interiorly open notches which the latch member can engage. 2 claims, 6 drawing figs.



1293. Egly RS
PROCESS OF BLANKETING WITH INERT GAS

UK Patent No. 1,474,830; CI A5A 28, (A62C 3/12), Appl 20 Nov 1975, Discl. 25 May 1977, Priority: USA, No. 541548, 16 Jan 1975, Assignee: IMC Chemical Corp, Inc, New York, NY

Disclosed in this patent is a method of blanketing a container of liquid with an inert gas, that is, displacing atmospheric oxygen with an inert gas from the head space of a container of liquid to reduce the hazard of detonation by shock. A process is provided for substantially eliminating oxygen from a shipping container while filling with a liquid, comprising the steps of: a) purging the shipping container with an inert gas by introducing the inert gas at the bottom of the container, pressurizing with the gas to at least 10 psig, releasing said pressure; b) repeating the pressurizing and releasing steps a number of times; c) introducing the liquid while maintaining the flow of inert gas until said container is filled; and d) closing the container securely. 12 claims, 1 drawing fig.

1294. Smith S
FIRE SEAL

UK Patent No. 1,474,030; CI A5A 20X5 37, (A62C 3/08), Appl 22 Sep 1973, Discl. 18 May 1977, Assignee: Rolls-Royce Ltd, London, UK

This invention relates to seals, in particular seals capable of withstanding exposure to fire, as for preventing the spread of fire at the interface between an aircraft air frame and engine. The fire seal comprises an elastic inner tube capable of being pressurized by fluid under pressure, a resilient fire-resistant intermediate layer surrounding the inner tube, and a resilient outer layer having greater wear resistance than the intermediate layer and capable of forming a fluid tight seal with an adjacent surface against which it is urged. 6 claims, 2 drawing figs. (Author)

5. FIRE PROTECTION OF STRUCTURES

h. Protective Components and Control Systems—Continued

1295. Cook SL

FIRE-RETARDANT LOW TEMPERATURE INSULATING BUILDING PANEL

US Patent No. 4,015,386; Cl 52/232, (E04C 2/26), Appl 7 Feb 1975, Discl. 5 Apr 1977, Assignee: Clark Door Co, Inc, Cranford, NJ

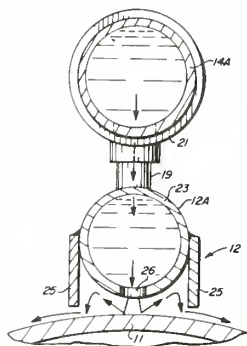
The patent concerns a fire-resistant door or other building panel for cold storage compartments including a sheet-metal casing containing a core of plastic foam insulation with a layer of a hydrous sodium silicate composition between the plastic foam core and the walls of the casing. In case of fire or high temperature conditions near the panel the silicate composition expands, forming a thick, cellular heat barrier that shields the foam plastic and affords fire protection equivalent to that of an approved fire door. 4 claims, 4 drawing figs. (Author)

1296. Olson BF

WATER BLANKET DELUGE SYSTEM

US Patent No. 4,023,621; Cl 169/68, (A62C 35/22), Appl 21 Jan 1976, Discl. 17 May 1977, Assignee: Inventor, Tempe, AZ

Disclosed is a water blanket deluge device and system for delivering a continuous layer of water over the surface of a metal tank to keep the vessel and its contents cool primarily as protection against tank overheating by exposure to nearby fires and secondarily as a temperature control means for the contents of the tank. 10 claims, 9 drawing figs. (Author)



1297. Wiggins EW and Malmberg QC

FLAME ARRESTING AND EXPLOSION ATTENUATING SYSTEM

US Patent No. 4,013,190; Cl 220/22, (B65D 1/24), Appl 27 Jun 1974, Discl. 22 Mar 1977, Assignee: McDonnell Douglas Corp, Long Beach, CA

A flame arresting and explosion attenuating system, particularly for use in fuel tanks and other similar structures which are designed to contain highly inflammable fluids, is disclosed. The tank or enclosure may be a single compartment or it may be divided or partitioned into a plurality of individual fuel cells of compartments, at least some of which communicate with one another through openings or apertures in the partitions which form them. The subject system is designed to prevent the propagation of

flame supported by combustion of the fluid within the tank and to quench the flame when it tries to spread from one compartment to another and to attenuate the explosive forces generated due to ignition of fluid by allowing the forces thereof to be distributed over the total volume of the enclosure so that there is little or no likelihood of the explosion damaging the enclosure. These and other things are accomplished by the present system at low weight and volume penalties and without unduly restricting or reducing fluid flow circulation and communication between the cells. The subject system includes one or more porous members positioned at locations in the enclosure where compartments communicate, and they may serve themselves to compartmentalize the container. Preferably at least a portion of some of the said porous members should extend across a liquid-gas interface. The subject members are of sufficiently open-celled constructions to permit relatively unrestricted liquid and gas flow therethrough, but the size of the pores is also important and should be such as to act to arrest or quench the propagation of a flame when it comes in contact therewith and tries to pass through, thereby preventing the flame from passing from one compartment to another in the enclosure. The porous members may also be wetted by the fuel and act as heat sinks. 1 claim, 18 drawing figs. (Author)

1298. Watts J

THE GOAL ORIENTED SYSTEMS APPROACH. Univ Maryland, Fire Prot Curriculum, College Park, MD; NBS GCR-77-103, 122 pages, 55 figs, 59 refs, Jul 1977
Availability: NTIS PB-273 174/3GA

This report is an introduction to the goal-oriented systems approach to building fire safety based on a review of the available literature. Included are discussions of the environment in which the concept was conceived, the genesis of the formalized procedures, the aspects conducive to reevaluation and the present and projected impact of this concept on the discipline of fire protection engineering. The conclusions drawn are that the goal oriented systems approach attempts to fulfill a significant need but is requisite of additional research. (Author)

I. WATER SUPPLIES

1299. OCEAN BV (Co)

FLUID PIPE NETWORK

French Patent No. 2,321,659; Cl F17D 3/10, A62C 36/16, Appl 20 Aug 1976, Discl. 18 Mar 1977, Priority: The Netherlands, No. 75/09.979, 22 Aug 1975, Assignee: Ocean BV (Co), The Netherlands

Disclosed is a pipe network for the transport of fluids under high pressure, especially in a fire protection system. The network consists of a main containing the pressurized fluid and a series of secondary pipes, or branches, fixed to the main pipe, each being closed by a plug and having a bleed upstream from the plug for emptying after use. The aim of the invention is to equip the outlets of such a network with an outlet plug which is normally open when the outlet is not in use but which closes at a given pressure in the branch pipes, obviating the necessity of emptying the branch pipe or the hydrant at the main because, after use, the plug is open. 9 claims, 2 drawing figs.

5. FIRE PROTECTION OF STRUCTURES

i. Water Supplies—Continued

1300. Bucher R
WATER SPRINKLER SYSTEM FOR FIREFIGHTING IN BUILDINGS

FRG Patent No. 2,645,886; Cl A62C 35/24, Appl 12 Oct 1976, Discl. 14 Apr 1977, Priority: Switzerland, Conv No. 13234-75, 13 Oct 1975, Assignee: Inventor, Risnach, Switzerland

A water sprinkler system is disclosed for fighting fires in buildings that have a water supply connection and a central heating system with at least one closed water circuit. The sprinkler system opens automatically when a given temperature is exceeded and is connected to the water circuit, the latter being connected to the water supply via a shut-off unit, distinctive in that a pressure sensor is connected to the water circuit, the shut-off unit is a valve connected to the pressure sensor, and that the pressure sensor and the valve are opened when the pressure in the water circuit drops below a prescribed value. The pressure sensor is connected to an alarm generator to generate an alarm when the pressure in the water circuit drops below a given value. 2 claims, 2 drawing figs.

1301. Beyler CL

EFFECT OF SELECTED VARIABLES ON THE DISTRIBUTION OF WATER FROM AUTOMATIC SPRINKLERS. Univ Maryland, College of Eng, Dept Fire Prot Eng, College Park, MD; NBS GCR-77-105, 64 pages, 54 figs, 2 tables, 3 refs
Availability: NTIS

The effects of flow rates, supply pipe size, direction of supply, deflector to ceiling clearance, orientation of sprinkler arms, angles of the sprinkler head, and sprinkler guards on the distribution of water from upright and pendant sprinkler heads have been studied. Three collection arrays were used to measure densities from one or two sprinklers. To evaluate the effects of the above variables data from tests were used in conjunction with a Synagraphic Mapping System (SYMAP) computer program to produce isodensity mappings of sprinkler discharges. (Author)

6. FIRE SAFETY

a. AGRICULTURE AND WILDLANDS

[For more complete coverage of the forest fire literature see *Forest Fire Control Abstracts* (Canada).]

1302. Matveenko V and Khar'kov V
REDUCING THE FIRE HAZARD OF FARM MACHINERY

Pozhar Delo; (4):19, 1977 (Russian)

The causes of fires during the operation of farm machinery and ways of eliminating them are examined. The most common cause is operation of machinery without spark arresters or with defective arresters. Often fires occur because straw hits parts that are strongly heated by friction or the exhaust manifolds of some engines. Cases are pointed out where fires occurred when masses of straw get wrapped around shafts and other machinery mechanisms. Measures of a technical and operational na-

ture aimed at reducing the number of farm machinery fires are enumerated. (RZh)

b. COMMERCIAL OCCUPANCIES

1303. Anon

BRITAIN CONTROLS HOTEL FIRE SAFETY

Fire Internat; 5(56):23-27, 1977 (English, French, German; Spanish Summary)

In 1972 a strong line was taken on fire safety in hotels in Great Britain. After introducing the Fire Precautions Act, which was designed to strengthen the law relating to means of escape and other fire precautions in "places of public amusement and resort, and in certain kinds of residential premises," the first category to be dealt with was "hotels and boarding houses." Owners and proprietors were required to apply to the local fire authority for a fire certificate, which was granted by a fire authority inspector. The certificate requirements for means of escape, provision and maintenance of other fire precautions, unobstructed exits, suitable fire alarm and firefighting equipment, staff training in fire drill, and changes which might lead to new fire hazards are discussed. 6 photos.

c. ELECTRICAL

1304. Ishiseki I

CARBON DIOXIDE FIRE EXTINGUISHING SYSTEM FOR OCCUPANCIES WITH ELECTRICAL ENERGY EQUIPMENT

Denryoku to Tetsudo; 27(2):25-27, 1977 (Japanese)

A description is given of the block diagram and operating principle of an automatic fire-extinguishing system using CO₂ as the extinguishant and designed for occupancies with electrical energy equipment, such as transformers, various types of electric generators, storage batteries, etc. The system comprises the following principal components: a network of fire detectors distributed over the entire occupancy; a receiver with detector network lines connected in parallel to the input; a digital logic element at the receiver output which decides on the presence and location of a fire; a battery of CO₂ cylinders under excess pressure; an array of electromechanical devices (solenoids) to control the discharge valves of the cylinders; a trunk pipeline for the supply of CO₂ from the collector of the battery of cylinders to the fire area; and a distributor pipe with nozzles through which the CO₂ is delivered directly into the premise. Each cylinder is continually connected to the CO₂ collector. Nonreturn ball valves were installed in the pipes leading from each cylinder to the collector, so that during the extinguishing operation CO₂ does not get into emptied cylinders whose valves remain open and does not leak out into the air through safety diaphragms. Pipes from the monitoring and signal devices of the discharge heads are connected to the signal collector of the battery of cylinders. Each row of cylinders is equipped with a cable system to open the set, commutated with the solenoid array. Also described is an acoustic and visual fire alarm subsystem forming part of the complex fire safety system. The system is universal and can be used in any size of electric power facility. Depending on the size of the area to be protected, the number of standard CO₂ cylinders con-

6. FIRE SAFETY

c. Electrical—Continued

tinually connected to the collector varies, as does the size of the distributor pipe network. Standards for the CO₂ flow rate per unit are given as a function of ceiling height, nature of the facility, and other factors. 4 figs, 4 tables. (RZh)

1305. Gayday V and Ryazanov K
CLEANSING FLUIDS IN THE REPAIR OF SHIP ELECTRICAL MACHINERY
Pozhar Delo; (5):28, 1977 (Russian)

It is recommended that methyl chloride be used as the agent for cleaning the insulation of electrical machinery in place of gasoline, benzene and toluene. Methyl chloride is a relatively nonflammable fluid, the least toxic chloro-organic compound. It is easy to reduce and to cover. In the fifteen years that it has been used, a considerable reduction in the time and volume of preparatory work has been achieved. (RZh)

1306. Kita K
STEPS TO INCREASE THE FIRE SAFETY OF COMMUNICATIONS EQUIPMENT
Shisetsu; 28(11):10-16, 1976 (Japanese)

Using an example of several typical models of equipment used in communications technology an analysis is made of the fire safety level achieved in Japan in 1975 for wire and wireless communication facilities and equipment. Considered in particular are the following typical communications facilities and individual pieces of equipment: urban automatic telephone exchange; fixed antenna field of long-wave radio station; urban radio broadcasting center; fixed and portable relay stations for long-range radiotelephone and radiotelegraph communication systems; TV center; multicore, coaxial and electrical power cables; transformer substations; and fixed and portable electrical power sets. A brief analysis is made of the progress achieved in providing these facilities and equipment with self-contained, automatic fire prevention and extinguishing means, as well as with fire warning systems. Special attention is devoted to problems connected with the fire safety of various radio-frequency and electric cables, because the burning of cable communication lines, especially concealed ones, creates particular fire-extinguishing difficulties and is also one of the main factors influencing fire spread. 3 figs, 3 tables, 5 refs. (RZh)

1307. Pedlow JW
ELECTRICAL ARC AND FIRE PROTECTIVE SHEATH, BOOT OR THE LIKE
US Patent No. 4,018,983; Cl 174/135, (C09K 3/28), Appl 9 Apr 1975, Discl. 19 Apr 1977, Assignee: Inventor, Media, PA

Disclosed is an electric arc and flame protective sheath or boot material for electrical, particularly for high voltage electrical, cables and complex electrical splices, junctures and the like, precast preferably from a liquid polyvinyl chloride plastisol, preformed into a selected shape of a protective sheath or boot, reinforced and protected against destruction by pre-mixing with a filler of heat resistant fiber containing flame and fire-retardant plasticizer as well as fire-retardant, preferably intumescent, and heat stabilizing substances. The precast sheath or boot is flexible and elastomeric and may be sized and shaped to be

slipped upon the cable or joint protectively to further insulate and protect it against electrical arcing, heat or fire. 17 claims, 11 drawing figs. (Author)

d. INDUSTRIAL OCCUPANCIES

1308. Nat Particleboard Assoc
DUST EXPLOSION AND FIRES: A MANUAL
Nat Particleboard Assoc, Silver Spring, MD; 18 pages, Aug 1977

The production of particleboard, medium density fiberboard and dry process hardboard panels involves inherently dusty processes and conditions which, under certain circumstances, can contribute to explosions and fire hazards. In order to minimize the risk of injury to personnel, serious property damage, and loss of production, special protection and prevention measures should be established and enforced, such as housekeeping (sweeping, vacuuming and blowdown), physical protection and prevention techniques (eg, dilution or minimization of dust clouds and of ignition sources, inerting, containment, separation or isolation of equipment, suppression, venting, specialized fire protection systems, building protection, equipment protection, and the like), and establishment of a procedures manual. The guidelines have been compiled from existing standards (NFPA, FMC) tempered by the industry loss experience, as well as independent hazard analysis and testing.

1309. Ivanov EN
YOUNG WORKERS LIBRARY SERIES ON SAFETY ENGINEERING: FIRE EXTINGUISHING EQUIPMENT FOR CHEMICAL PLANTS [Seriya Bibliotekha Molodogo Rabochego po Tekhnike Bezopasnosti: Tekhnicheskie Sredstva. Tusheniya Pozharov na Khimicheskikh Predpriyatiyakh]
Khimiya, Moscow, USSR; 1st edit, 168 pages, 1976 (Russian)

Title only available.

1310. Blacktop D [Fire Service College, UK]
FIRE PREVENTION TRAINING FOR INDUSTRY
Fire; 70(869):301-302, 1977

Fire prevention training for industry should be held on three levels: senior or general management, with fire matters integrated among the many other aspects of managerial study; special and middle management, with fire training obtained either as part of educational courses or in the training facilities of fire authorities as one-day seminars or sources; and workers in the factory, shop, or office, with fire prevention taught within the organization according to an on-the-job training scheme. Training needs of the fire service are best dealt with by a system of progressive training for all members of the service. The objectives for fire safety and prevention training are defined as minimization of opportunities for personal injury, loss of life, property damage and product interruption. Training effectiveness must be insured.

1311. Halpaap W [Bayer AG, Dormagen, FRG]
SPECIAL APPLIANCE FOR THE CHEMICAL INDUSTRY
Fire Internat; 5(56):44-50, 1977 (English, French, German; Spanish Summary)

6. FIRE SAFETY

d. Industrial Occupancies—Continued

A special fire apparatus designed and fitted according to the needs of the chemical industry to control fires in high or particularly hard-to-reach installations is described and illustrated. The apparatus consists of a three-section hydraulic boom mounted on a suitable chassis, extendable to 30 m, rotatable through 360°, and remote controlled by a single operator. The boom monitor has an output of more than 5,000 ℓ /min water or 60 m^3 /min low-expansion foam. The jet will reach a height of 60-100 m and has a range of 80-120 m, depending on wind conditions. The water supply and boom are described in detail. 10 figs.

1312. Anon

FIRE AND EXPLOSION HAZARDS OF COMPRESSORS*Fire Prev*; (122):19-21, 1977

The fire and explosion hazards of compressors are identified as arising usually not from the compression cylinder itself, but from the pipework and equipment on the discharge side. The ignition sources are compression/auto-ignition of oil mists or vapors, static electricity, and improper choice of lubricating oil. Constant monitoring facilities are recommended for the air and cooling water temperatures, the pressure drop through filters, the temperature and flow of the cooling oil. The design and arrangement of compressor systems, namely, location, air inlet placement, arrangement of after-coolers, and discharge pipework, are described. Precautions (planned preventive maintenance based on manufacturers' recommendations) are outlined. 2 photos.

1313. Anon

HAZARDS AND HAZARD PREVENTION IN SHRINK-WRAPPING*Fire Prev*; (121):30-31, 1977

Cardboard cartons have caused rapid fire spread in many warehouses and packaging departments. A technique which replaces large amounts of cardboard with comparatively small quantities of thin plastic sheets should reduce the fire risk. Shrink-wrapping does result in less combustible material being used, but there are two other factors to consider: the process itself may cause a fire (eg, high operating temperature of the shrink-wrapping machines) and the waterproof covering may hinder firefighting operations. The first of these is the subject of this note. 1 photo. (Author)

1314. Anon

EXPERIENCE IN THE USE OF AUTOMATIC EXPLOSION-SAFETY SYSTEMS*Keiso*; 20(2):76-79, 1977 (Japanese)

A brief analysis is made of the present status of development of automatic explosion-safety systems used in combination with industrial technological assemblies and systems involving, to a greater or lesser degree, electricity. Some typical block diagrams are given and the operating principle of such systems is examined. Their reliability and their operating factors are analyzed as a function of the reliability and corresponding factors of individual assemblies, components, and elements. A study is made of aspects of the explosion protection of technological systems, either structurally integral with or located in the immediate vicinity of fixed reservoirs with

fire- and explosion-hazardous liquids. The main technical specifications for such explosion-protection systems are formulated. An example is given of optimal spatial disposition of such a system relative to the technological equipment and fixed reservoir, which is an important condition for the effective use of this kind of system. 4 figs, 2 refs. (RZh)

1315. Skomorokhov B

CYCLONE FURNACES FOR BURNING UP SOOT*Pozhar Delo*; (5):29, 1977 (Russian)

In order to prevent sparks from escaping from smoke stacks and thus to eliminate fires in the production of acetylene at the Nevinomysk "Azot" Industrial Combine (USSR), shaft furnaces have been replaced by cyclone furnaces, which burn the soot more thoroughly. Production wastes such as homologs of acetylene with synthetic or natural gas are used as the furnace fuel. (RZh)

1316. Zakomornyy A

AN IMPORTANT RESERVE IN FIRE HAZARD REDUCTION*Pozhar Delo*; (3):28-29, 1977 (Russian)

Firefighters of the city of Kharkov (USSR), in cooperation with the technical and engineering personnel of plants and the staff of research institutes, are proceeding with work aimed at replacing the flammable fluids used in production by inflammable fluids. Examples are cited for the use of surfactants to clean, degrease, check seals, etc in the place of kerosine, white spirit, and other liquids. (RZh)

1317. Riley RG [*Packaging Corp of America, Evanston, IL*]**PLANNING TO AVOID DISASTER — 2. FIRE-PROTECTION EQUIPMENT***Pulp Pap*; 51(4):98-101, 1977

Fire safety precautions, especially for paper and paper products plants, are outlined with respect to fire causes (electrical failure), water supply and automatic sprinklers, exits, fire doors and cutoffs, fire extinguishers and hose lines, flammables, securing of refueling areas, and employee training. It is stressed that safety and fire protection must be considered as a production cost. 1 fig, 4 photos.

1318. Schoenherr J

PROBLEMS OF PERSONAL HEAT PROTECTION IN PLANTS WITH FIRE AND EXPLOSION HAZARDS*Tech Ueberwach*; 18(5):173-177, 1977 (German)

The problems of personal heat protection in plants with fire hazards and hazards connected with explosives are discussed. Studies are made of hazardous worksites in refineries and similar plants, as well as in plants for the production of aluminum-alkyl compounds and in plants of the explosives industry. Special clothing is commercially available, but not for plants with explosives. For this reason, developmental work for this kind of protective clothing is described, aimed at meeting the special requirements of the worksite in the explosives industry. 11 figs, 15 refs. (Fachdok 13/0894)

6. FIRE SAFETY

d. Industrial Occupancies—Continued

1319. Schilling F

PROTECTIVE ELECTRIC BRIDGING CONDUCTOR FOR DISCONNECT POINTS IN PIPELINES

FRG Patent No. 2,549,750; CI A62C 3/04, Appl 6 Nov 1975, Discl. 18 May 1977, Assignee: Aktiengesellschaft fuer Versorgungs-Unternehmen (AVU), Gevelsberg

The invention relates to a protective electric bridging conductor for disconnect points in pipelines, especially for piping systems carrying fire-hazardous agents such as gases, to replace the practice of standing by with fire extinguishers to protect against possible ignition of the gas when disconnecting pipes. 4 claims, 1 drawing fig.

e. INSTITUTIONAL OCCUPANCIES

1320. Dussy R

SAFETY IN THE OPERATING WARD

Rev Tech Feu; 18(166):14-17, 1977 (French)

The operating area of a hospital is usually located in a separate ward and consists of several operating rooms and auxiliary rooms. The hazard of fire and explosion is due to the use of combustible gases during operations (volatile narcotics, oxygen) and electrical instruments, tools and illuminating devices which are capable of giving off sparks. Another hazard is the accumulation of charges of static electricity, the possibility of injury from electrical current, gas intoxication, contamination by pathogens, and radiation injuries. Safety measures are examined. A ventilation system that can exchange the air at least six times an hour should be provided to remove combustible and toxic gases from operating and anesthesia rooms. 6 figs. (RZh)

1321. Wooliscroft MJ

THE HOSPITAL FIRE PROBLEM

Rev Tech Feu; 18(164):22-25, 1977 (French)

The number of people who died in hospital fires in London in 1968 was 24, 4 in 1969, 5 in 1970, and 30 in 1972. A certain number of these fatalities was caused by careless smoking in bed, but the greater number died during fully developed fires, which represent a very great hazard, especially in psychiatric hospitals. It is pointed out that a cardinal solution to the problem of ensuring fire safety in hospitals requires substantial material expenditures and that it is necessary above all to provide hospital occupancies with an automatic fire detection system. (For related articles by the same author see abstract 1374 in FTA 1(4) and abstract 1919 in FTA 1(5).) (RZh)

1322. Keating JP and Loftus EF

VOCAL EMERGENCY ALARMS IN HOSPITALS AND NURSING FACILITIES: PRACTICE AND POTENTIAL.

Univ Washington, Dept Psychol, Seattle, WA; NBS GCR-77-102, 33 pages, 2 tables, 30 refs, Jul 1977

Availability: NTIS PB-273 165/1GA

This report reviews current usage of voice emergency alarms in nursing homes and hospitals, and recommends guidelines for the development of alarm messages, which should facilitate effective personnel response to fires in health care facilities. A sample message is provided which can serve as the basis for a national or regional standard. (Author)

f. MINING

[For more complete coverage of the mining literature see **SMRE Safety in Mines Abstracts** (UK).]

1323. Barnes VC, Badenhorst GP and Joubert FE

STEPS TO MINIMISE SELF-HEATING, INCIPIENT FIRES IN COAL MINES

S Afr Min Eng J; 88(4129):71, 73, 75, 77, 79, 81, 1977

Precautionary measures to reduce the probability of incipient heating in coal mines, such as design considerations to provide quick and effective isolation and flexibility in ventilation control, preventive mining methods, and material reclamation, practical early detection from the indications of heating, and safety procedures in dealing with colliery fires, particularly a carefully planned and drafted code of practice, are discussed. 1 fig.

1324. Kawashima K

AUTOMATIC FIRE SAFETY SYSTEM IN THE ASHIBETSU BITUMINOUS COAL MINES

Tanko Shin Gijutsu; (25):61-66, 1976 (Japanese)

A description is given of the design, operating principle, and results of operational tests of a complex automated fire safety system installed in one of the bituminous coal mines of the Ashibetsu mining region (Japan). Employed in the system are several types of automatic fire detectors, as well as a water spray subsystem designed both to extinguish fires and to reduce the temperature and improve the microclimate in the mine. The water spray system uses mainly sprinkler heads which are actuated at a temperature of 70-80°C (in the fire-extinguishing mode). The length of each water-spray section, which is a pipe with sprinkler heads, is about 2.5 m. The sprinkler system is supplied from a fixed water fire main. A total of 120 sprinkler heads was installed in the mine, each head delivering 0.25 l/s at a mains pressure of 8 kgs/cm². Two pumping stations located outside the mine are provided for servicing. Each station has push buttons for actuating and stopping the sprinkler pump, from which a 150 mm pipeline leads to the two stations. An individual pipeline leads to each section, ensuring parallel supply of the sections and, consequently, a reasonable water flow. Each pipeline is equipped with a fast-action valve. At the points where the individual pipelines join their respective sections, special valves are provided which permit regular checks to be made of the sprinkler pump, as are drain cocks for drying the pipes of the sprinkler system. Widely used in the mine in addition to the fixed automatic fire safety system are manual firefighting means, in particular small hand-operated foam extinguishers forming part of the set of equipment issued the miners and other mine personnel. 16 figs. (RZh)

1325. Reid GR

AUTOMATIC FIRE PROTECTION SYSTEM FOR MOBILE UNDERGROUND METAL MINING EQUIPMENT. VOL 1. EXECUTIVE SUMMARY OF FINAL REPORT.

Ansul Co, Marinette, WI; BuMines OFR-111(1)-77, 235 pages, Jan 1977

Availability: NTIS PB-268 735/8GA

The objective of this report was the development and in-mine testing of an automatic fire control system (AFCS) for mobile underground metal mining equipment. The re-

6. FIRE SAFETY

f. Mining—Continued

port covers the period from June 21, 1975 through June 30, 1976, and accomplished the following tasks: 1) Preparation of data handling plan and data acquisition which included visits to 20 mine sites in 11 states, visits to Bureau of Mines and Mining Enforcement and Safety Administration facilities, and a literature survey; 2) Data analysis that determined the most hazardous type of vehicle for use in the demonstration, and design requirements for the AFCS; 3) development of recommended design concepts for the AFCS; 4) design and development of the AFCS, including tests on a full-scale mockup of a load-haul-dump (LHD) vehicle; 5) underground fire tests on an ST-2B-LHD vehicle at the Hecla Lakeshore mine in Casa Grande, Arizona. (Author)

1326. Reid GR

AUTOMATIC FIRE PROTECTION SYSTEM FOR MOBILE UNDERGROUND METAL MINING EQUIPMENT. SELECTION AND USE MANUAL. Ansul Co, Marinette, WI; BuMines OFR-111(2)-77, 16 pages, Jun 1976
Availability: NTIS PB-268 769/7GA

This manual is for use by mine operating personnel and vehicle manufacturers in the selection and proper use of automatic fire protection systems for underground metal and nonmetal mining vehicles. Most of the currently available systems are manually operated, dry chemical fire suppression systems. When properly designed, installed, and maintained, these systems have proven to be effective both in fire suppression and in withstanding the rugged mine environment. Portable fire extinguishers and manually actuated systems have provided adequate protection for most of the reported fire incidents. (Author)

1327. Baum B

STUDY OF COATINGS FOR IMPROVED FIRE AND DECAY RESISTANCE OF MINE TIMBERS. FINAL REPORT, DEC 1975-MAY 1977. DeBell and Richardson, Inc, Enfield, CT; NASA CR-152009, 88 pages, May 1977
Availability: NTIS

The purpose of this program was to find a fire- and rot-retardant polymer/fungicide reaction product for coating mine timbers. Fire-retardant polymers were screened as films and coatings on fire wood. Curable polyamide appeared to be flame retardant and evolved a minimum of fumes when exposed to a flame. Several organic and metal, low toxicity, fungicides were reacted with the polyamide *in-situ* on the wood. These coated samples were screened for fungus resistance. All formulations rated well — even the polyamide film without additives was fungicidal. The fire wood control itself resisted internal damage during the ten weeks of fungus exposure. A more severe test for fungus resistance will be required. (Author)

1328. Schwarz HR

IMPROVED FIRE DETECTION SYSTEMS FOR METAL AND NON-METAL MINES. Rockwell Internat, Collins Commerce Telecomm Div, Cedar Rapids, IA; BuMines OFR-113-77, 150 pages, Jan 1977
Availability: NTIS PB-268 706/9GA

A systems approach to the design of mine fire detection systems is presented. This approach considers the relationship between several characteristics of a mine, the characteristics of fires, and the applicability of fire detection

devices. A test system developed with this design approach is detailed. The results of a 3-month system evaluation program in a mine are presented and discussed. (Author)

g. POWER PLANTS

1329. Anon

FIRE PROTECTION FOR POWER STATIONS
Electr Rev (London); 200(13):20-21, 1977

Described are methods of detecting and extinguishing fires in power stations, including the Beam Master, a photoelectric detector with a light beam in the infra-red spectrum, particularly useful in the tunnels, large dusting and cable flats; the Ion Master, a stable ionization unit for detection of combustion products; and the Zone Master, a control and indicating panel for use with automatic and/or manual fire alarm systems and CO₂ and halon fire extinguishing systems. 2 photos.

1330. Anon

FIRE PROTECTION OF TRANSFORMER STATIONS
Seisan to Denki; 29(2):38-41, 1977 (Japanese)

An analysis is made of the main trends in increasing fire safety of automatic transformer stations supplying power systems of industrial enterprises with high-voltage transmission lines. The most typical causes and sites of fire outbreak in substations are outlined, and recommendations are made for improving the design of equipment to increase its fire safety. The most effective means are as follows: introduction of automatic fire detection and suppression systems operating in conjunction with automatic cutoff devices for high-voltage commutation circuits within a substation; the development and introduction of incombustible transformer mineral oils and their unification; the creation of centralized networks of remote visual monitoring of the fire status of electrical substations by means of terminal TV transmitter cameras; and other measures. (RZh)

h. PUBLIC BUILDINGS

1331. Isaev MN and Pustynnikov S

AUTOMATIC FIRE EXTINGUISHMENT IN MUSEUMS
Pozhar Delo; (3):27, 1977 (Russian)

The most suitable agent for extinguishing fires in museums is carbon dioxide. But because museum halls are, as a rule, large, extinguishing systems for them require a large number of cylinders. It is proposed that the carbon dioxide be stored in one large, thermally insulated container in which the temperature is maintained at about -20°C by means of a cooling system and the pressure does not exceed 20 kgs/cm². The advantages of the system are a reduction in metal containers, a reduction of storage area, and simplification of maintenance. The use of this system becomes economically feasible when not less than 2000 kg of carbon dioxide is stored. (RZh)

6. FIRE SAFETY

I. RESIDENTIAL OCCUPANCIES

J. TRANSPORTATION (Air, Rail, Road, Water)

1332. Stavitskiy MG (Ed)

FIREFIGHTING ON BOARD SHIPS. VOL 1. SHIP FIRE HAZARD [Bor'ba s Pozharami na Sudakh. Tom 1. Pozharnaya Opasnost na Sudakh]
Sudostroenie, Leningrad, USSR; 1st edit, 136 pages, 1976 (Russian)

Experience gained in fighting fires on ships of various types during operation, under construction and repair is considered in Vol 1 of this reference work. The particular features of the use of firefighting means in ship fires are demonstrated. Methods and results of research into the thermophysical and fire-hazard characteristics of materials used in shipbuilding are discussed, as is the fire resistance of ship structures. Experimental data on the parameters of development of the burning process in ship compartments and along evacuation routes are presented. This reference work is intended for specialists in ship structural design bureaus, shipyards, and ship repair facilities, for water transportation personnel, workers in the fishing industry and in the fire service. (Author)

1333. Stavitskiy MG (Ed)

FIREFIGHTING ON BOARD SHIPS. VOL 2. WAYS AND MEANS OF FIGHTING FIRES ON SHIPS [Bor'ba s Pozharami na Sudakh. Tom 2. Sredstva Bor'by s Pozharami na Sudakh]
Sudostroenie, Leningrad, USSR; 1st edit, 320 pages, 1976 (Russian)

The principles of ship fire protection are presented in Vol 2 of this reference work, and recommendations are made with regard to the design of a set of ways and means for structural and active ship fire protection to conform with the requirements of the 1974 International Convention on Safeguarding Human Lives at Sea and the existing regulations for the construction of ships in the USSR. The characteristics of shipbuilding materials are summarized, taking into account their fire-hazard properties and present and future fire-extinguishing, detection and alarm systems and apparatus. Methods of testing the planned means and systems of active fire protection used in ships in operation, under construction or repair are analyzed. This reference work is intended for specialists in ship structural design bureaus, shipyards, and repair facilities, for personnel in water transportation, in the fishing industry and in the fire service. (Author)

1334. Anderson RA and Johnson GA [Boeing Commercial Airplane Co, Seattle, WA]
AIRCRAFT INTERIOR SANDWICH PANEL DEVELOPMENT; Paper No. 5.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 371-405
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 440 in *FTA* 2(1/2). 24 figs, 7 refs.

1335. Litant I [Dept Transp, Transp Sys Center, Cambridge, MA]
FIRE SAFETY IN GROUND MASS TRANSPORTATION; Paper No. 2.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 278-288
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 441 in *FTA* 2(1/2).

1336. Lukemire C [Nat Railroad Passenger Corp, Washington, DC]
SELECTION OF MATERIALS FOR RAIL PASSENGER CARS; Paper No. 2.2
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 289-298
Sponsor: Univ San Francisco, Fire Safety Center

Materials are selected for rail passenger cars in accordance with the guidelines for flammability and smoke emission, or as closely to the guidelines as possible, depending on availability. Selection procedures are outlined, along with the problems encountered in compliance testing. Gradual replacement of older materials not meeting present fire-safety guidelines is underway. 6 photos.

1337. Anon
FIRE PROTECTION IN HIGHWAY TUNNELS
Cerberus Alarm; (71):1-5, 1977 (German)

The danger to which a tunnel and its users are exposed by fire can be considerable if the possibility of fire outbreak is not strongly reduced by measures of a structural, operational, and organizational nature. If, nevertheless, a fire does occur, early detection can be a decisive factor for minimum fire spread. Suitable fire detection systems for tunnels are thermo-maximum detectors (point detectors), which are used almost exclusively in Europe. Also being tested is a pneumatic system. A new system combines the advantages of both of these systems. The rate-of-rise detectors contain two sensors with different rate-of-rise characteristics. Actuation of one sensor triggers a preliminary signal; actuation of both triggers an alarm. 5 figs, 2 tables, 7 refs. (Fachdok 13/0943)

1338. Ioshinara H
FIRE SAFETY SYSTEM AT THE UENO RAILROAD STATION
Denryoku to Tetsudo; 27(2):6-9, 1977 (Japanese)

A description is given of the operating principle, arrangement, and main tactical and technical parameters of equipment comprising the complex automated fire safety system of the Ueno (Japan) railroad station. The characteristics of the Ueno railroad junction as an installation with a potential fire hazard are given. The building complex of the junction includes the station, electrical locomotive and car sheds, electromechanical repair shops, and liquid and solid fuel storage areas. The yards of the junction are criss-crossed with tracks holding various kinds of rolling stock, including tank cars containing substances and materials with a high level of fire hazard. It is pointed out that the highly developed track network restricts approach to the site of potential fires and hinders fire-extinguishing efforts. The automated fire safety system, which uses an electronic signaling system and a combined foam-

6. FIRE SAFETY

j. Transportation (Air, Rail, Road, Water)—Continued

powder extinguishing system, provides protection for the above-mentioned fixed station installations, while the usual types of fire control are designed to extinguish rolling-stock fires. The Ueno junction is equipped, in particular, with a system of fire hydrants and water reservoir structures. 8 figs, 3 tables. (RZh)

1339. Kitagawa M

FIRE SAFETY SYSTEM FOR A RAILROAD TUNNEL

Denryoku to Tetsudo; 27(2):19-21, 1977 (Japanese)

A description is given of the composition, operating principle, and some technical parameters of a complex fire safety system to be used in the railroad tunnel of the new Yeayuku trunk line, having a diameter of about 10 m and a length of 1800 m. A 30 kV contact network, the main object of fire protection, is laid in the tunnel. The complex fire safety system includes the following main subsystems: various types of fire detectors distributed over the inner surface of the tunnel providing redundancy at all points owing to the use of paired detectors, each with an independent commutation line with receiver; an automatic combined foam-powder extinguishing system providing a spray of extinguishant through nozzles disposed at nodes of the pipe network (extinguishment begins automatically in response to the receiver, whose logic member has decided on the outbreak of a fire), or through sprinkler heads, each equipped with individual fusible safety locks which are actuated at a temperature of 75°C; service communication traffic line; a remote visual system to supervise the fire status of the tunnel by means of several automatic TV camera transmitters, each monitoring a certain section of the tunnel; and an automatic switching system to cut off a segment of the high-voltage contact line passing through the tunnel. 3 figs, 8 tables. (RZh)

1340. Anon

RAPID INTERVENTION VEHICLE FROM AMERICA

Fire Internat; 5(56):77-78, 1977 (English, French, German; Spanish Summary)

A rapid intervention airport crash vehicle called "Rapid-1" has been introduced. It has a guaranteed acceleration of 0-50 mph (0-80 km/h) in 18 sec while carrying 3350 lb (1520 kg) of agents, three crewmen, and 1000 lb (454 kg) of auxiliary equipment. Two other features of the vehicle of particular importance for rapid intervention are: 1) a dual-agent rooftop monitor, controlled from the cab by either the driver or a crew member; and 2) a drive train which automatically provides true four-wheel drive at all times whether on pavement or off runway. 1 photo.

1341. Anon

PROTECTIVE SYSTEMS FOR ENSURING FIRE SAFETY AT SEA

Fire Prot Rev; 40(445):12-15, 1977

Reviewed in this article is some of the published information on fire safety requirements applicable to ships and platforms. The papers reviewed cover such matters as sprinkler and spray systems for maritime use (Building Res Establishment Current Paper CP 1/77, reviewed in *FTA* 1(6), abstract 2158); the carriage by sea of hazardous cargoes requiring environmental control (MZ Navaz, *Trans Inst Marine Engrs*, 83(9):1971); fireboats and ship fires

(*The Manual of Firemanship, Part 7, Fireboats and Ship Fires*, 1972); and foam sprinkler installation on simulated oil rig fires (RA Young and JG Corrie, Building Research Establishment Current Paper CN 98/75, reviewed in *FTA* 1(3), Abstract 916). 4 refs.

1342. Akita K and Shiohara R

FIRE PREVENTION IN SHIP TRANSPORTATION OF FIRE-HAZARDOUS MATERIALS

Zosen Gijutsu Kenkyu Kaihatsu Yoyakushu; (8):147-149, 1976 (Japanese)

Problems connected with the fire safety of various fire-hazardous substances and materials transported by sea are analyzed, problems which are very pressing in view of the increasing volume and range of liquefied gas and chemical products being transported by sea. Intensive work is being done in Japan on inerting cargo holds and ship tanks. It is pointed out that in transporting cargoes capable of interacting with carbon dioxide, inert gases cannot be used because they contain CO₂. At the present time a method has been introduced to inert ship-transported gaseous nitrogen obtained from liquid nitrogen stored on the ship in special containers. This method will be further developed in the near future because a system has been introduced which makes it possible to obtain gaseous nitrogen from the air. This will greatly reduce the cost of ship systems for inerting gas cargoes. Widely used to extinguish liquid petroleum products carried in ship tanks (containers) is a method of delivering a low-expansion foam from below through a layer of petroleum products. This foam can be easily prepared from a 6% solution of fluorocarbon agents in fresh or sea water and has, preferably, an expansion of 7-12. This fire-extinguishing foam does not disintegrate as it passes through the petroleum product and forms on its surface a continuous protective layer to prevent petroleum product vapors from penetrating the combustion zone. Also analyzed are problems associated with the fire safety of dry-cargo ships. It is pointed out that an arrangement must be introduced whereby the shipper hands over to the port authority and the ship captain data which characterize the fire status and properties of the cargo to be transported with a high degree of accuracy, especially data on the cargo temperature, moisture, looseness, etc. Also considered are organizational problems connected with the fire-safety regulation of maritime transportation of fire-hazardous dry cargoes.

1343. Simon S

SAFETY TANK AND FIRE EXTINGUISHER

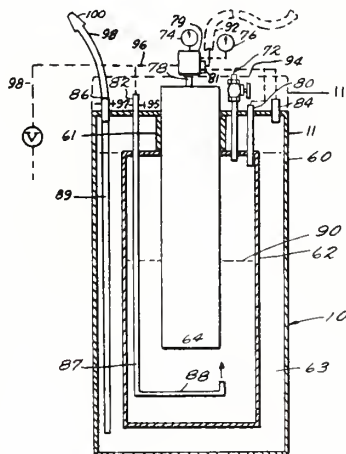
US Patent No. 4,019,583; Cl 169/62, (A62C 35/12), Appl 26 Feb 1976, Discl. 26 Apr 1977, Assignee: Inventor, Pittsburgh, PA

The invention relates to an improved gasoline safety tank and fire extinguisher comprising a tank body with interchangeable inlet and outlet fittings secured thereto, an intermediate container mounted in the tank for holding gasoline, and a carbon dioxide bottle mounted in the intermediate container. A conduit is connected to an inlet fitting and extends into the intermediate container adjacent to the floor of the intermediate container and below the level of liquid placed in the intermediate container. A pressurized carbon dioxide bottle is selectively

6. FIRE SAFETY

j. Transportation (Air, Rail, Road, Water)—Continued

connected to the inlet fitting and adapted to discharge pressurized carbon dioxide gas into the intermediate container so that the gas bubbles up through the liquid in the intermediate container into the top of the intermediate container, simultaneously cooling the liquid and pressurizing the liquid in the intermediate container. The carbon dioxide bottle is connected to the tank to pressurize a foam placed in the space defined by the outer wall of the intermediate container and the inner wall of the tank body so that the foam will be expelled from the tank when the tank wall is punctured. A flexible hose is mounted to the tank body for connection to the carbon dioxide bottle so that carbon dioxide can be discharged from the bottle to fill tires and the like. Another flexible hose is selectively mounted on the opposite side of the tank and connected to a fitting having a connected conduit which extends into the space defined by the outer wall of the intermediate container and the inner wall of the tank. The foam pressurized by the carbon dioxide can selectively be discharged through the hose from the tank for fire extinguishing purposes. 14 claims, 3 drawing figs. (Author)



1344. Rayfield JF
DEVELOPMENT OF A FIRE PROTECTIVE OVERGARMENT FOR USE BY AIR CARRIER FLIGHT ATTENDANTS. Ilc Industries, Inc, Frederica, DE; FAA RD-77-18, Feb 1977
 Availability: NTIS AD-A042 329/3GA

The objective of this effort was to develop a garment to provide protection to flight attendants in proximity to cabin fires. Based on laboratory flame and heat flux tests garment materials were chosen. A prototype garment was fabricated, including a breathing system and hood. The garment was tested for donning and mobility in an aircraft cabin, and was subjected to a simulated cabin fire exposure that approximated the contract design conditions. (Author)

7. FIRE SERVICE ORGANIZATION AND FACILITIES

a. ADMINISTRATION, ORGANIZATION AND MANAGEMENT

1345. Nailen RL
FROM COLONIAL RATTLE TO COMPUTER DISPATCH
Fire Eng; 130(11):51-52, 57-58, 1977

The history of the development of communications in fire service operations in the United States is reviewed. 1 fig, 5 photos.

1346. Higgins M [Tyne and Wear Metropolitan Fire Brigade]
MOBILISING: AN AID TO FIRE SAFETY
Fire Eng J; 37(108):31-33, 1977

The objectives aimed at in mobilizing fire brigades to reduce response times, thus minimizing the loss of both life and property, are defined as determining and dispatching the response crew as speedily as possible, providing information and resource support, maintaining a record of action taken, and rearranging the reduced resources to provide optimum fire cover. The policy decision adopted to realize these objectives was that the control room would be considered as an emergency center, concerned primarily with situations requiring prompt action. To realize these policies, improved methods were sought for the storage and rapid retrieval of the records initially required for the provision of response data. A compact automatic retrieval display (CARD) system was adopted, the consoles, system layout, operation, fire apparatus cab reader, and microprocessor of which are described in detail. (Paper presented at the Institution of Fire Engineers (UK) Annual Conference held at Brighton on 28-29 September, 1977.)

1347. Anon
TOKYO: CITY WITH A FIRE PROTECTION PROBLEM
Fire Internat; 5(56):28-31, 1977 (English, French, German; French Summary)

A brief survey is given of the fire-protection inventory of personnel and equipment of the Tokyo Fire Department, the preventive efforts, special preparations for earthquake disasters, the helicopter fleet (5 helicopters), and station operations. Deficiencies in number of stations and equipment are enumerated. 8 photos.

1348. Finnerty JD [Nav Postgraduate School, Monterey, CA]
HOW OFTEN WILL THE FIREMEN GET THEIR SLEEP?
Manage Sci; 23(11):1169-1173, 1977

We calculate the expected additional fire protection cost to a city implied by the 1974 amendments to the Fair Labor Standards Act. Under the amendments, if a city chooses not to pay its men who are on duty for more than 24 hours at a time for sleep and meal time, it may exclude up to 8 hours of sleep time, but must compensate them at overtime rates for the entire sleep period if one or more alarms prevent them from obtaining at least five

7. FIRE SERVICE ORGANIZATION AND FACILITIES

a. Administration, Organization, and Management—Continued

uninterrupted hours of sleep in that period. Interalarm times are modeled as a Poisson process, and both point and interval estimates of the additional annual overtime cost are computed for the city of Monterey by estimating the annual number of interrupted sleep periods. A model that permits the rate at which alarms are received and the length of the designated sleep period to be varied is developed for computing the proportion of nights in the year during which the firemen get five uninterrupted hours of sleep. A procedure for adjusting the model to allow for the time spent in response to an alarm is also described. (Author)

1349. Karpov V

FIRE ASSISTANCE TO DISTRICTS*Pozhar Delo*; (5):23, 1977 (Russian)

The work being done by the regular fire extinguishing staff of Kuibyshev Province is examined. Operational district plans have been developed which contain information on each district (roads, firefighting personnel and equipment, the operational characteristics of population centers, the most important premises, etc). The main data items are entered on topographic maps measuring 1 x 1 m. Operations personnel of the district fire service conduct trials at headquarters. Headquarters personnel drive out into the districts to help out and conduct training exercises. A description is given of a complex fire that was successfully extinguished owing to the well-organized work of the staff. (RZh)

b. EDUCATION AND TRAINING

1350. Smith JL [Delaware State Fire School]

GROUND LADDER OPERATIONS

Robert J Brady Co, Bowie, MD; 1st edit, 125 pages, 1977

This up-to-date book on ground ladder operations begins by describing types and construction of ladders, such as wooden and aluminum, straight, roof, extension, Bangor (longer than 35 ft), Pompier (single-beam), collapsible and A-frame. The operations portion of the book covers in detail such topics as ladder maintenance, climbing, carrying, loading, raising, special applications (various raises, bridging, hoisting with rope, tying for safety, rescuing victims, etc), and inspection and testing. Safety is emphasized throughout and instruction is enhanced by 146 illustrations. Also available separately from the publisher are two different sets of visual aids to accompany the book, in the form of overhead transparencies and 35-mm slides, or both sets together, covering: 1) carrying, raising and climbing, and 2) tactical applications.

1351. Zuccarelli LA [Northern Va Community College, Annandale, VA]

DEFINING FIRE SERVICE TRAINING*Fire Command*; 44(11):29-31, 1977

A variation of the management-by-objectives (MBO) technique is applied to the analysis of fire department training functions. Statements of instructional objectives are derived from a determination of job performance requirements (task analysis), convey the instructional intent, and are used in the design and preparation of instruction to insure that instruction is consistent with the stated objectives. 2 figs, 7 refs.

1352. Bizjak TC [Maryland Fire and Rescue Inst, College Park, MD]

MASK RELIABILITY, AIR QUALITY COME FIRST IN MARYLAND TRAINING PROGRAM*Fire Eng*; 130(12):26-27, 1977

Because of the importance of self-contained breathing apparatus, the Maryland Fire and Rescue Institute in College Park, MD, provides extensive training in this area. To accomplish the training task, the Institute maintains an inventory of 72 complete demand air masks and 30 additional 30-minute air cylinders. During fiscal 1975-76, approximately 3,000 students used these masks while participating in breathing-apparatus training. Two three-hour classes on basic mask donning and related procedures are required for each student enrolled in the basic fireman-ship course. Advanced courses, such as structural firefighting and search and rescue, are offered to help increase firefighters' confidence in breathing apparatus. The compressor used to produce clean, dry, breathing air, air testing schedules and procedures, the responsibilities of the breathing apparatus technician, and the repair shop are described. 6 photos.

1353. Lemon PWR and Hermiston RT [Univ Windsor, Ontario, Canada, Faculty of Human Kinetics]

PHYSIOLOGICAL PROFILE OF PROFESSIONAL FIREFIGHTERS*J Occup Med*; 19(5):337-340, 1977

This investigation assessed the physical characteristics, functional capacities, and body composition of 45 professional firefighters, aged 23 through 49 years. Maximum oxygen uptake (VO₂), recovery oxygen uptake, arm and leg strength, all showed a negative linear relationship with age. On the other hand, percent body fat increased with age from 18% to 21%. Hand grip strength did not decline significantly, as the grip strength values remained fairly constant for all of the firefighters studied. Most of the data collected were considered to be within the normal range of the sedentary North American population. It was concluded from these data that professional firefighters might well benefit from a training program designed to develop and maintain a higher level of personal fitness. 4 figs, 3 tables, 18 refs. (Author)

1354. Connick WB [Stanford Res Inst, Menlo Park, CA, Fire Prot Eng Group]

A FIRE SERVICE CRITIQUE*Fire Protection Technology Seminar, Annual, Second, Proc*; 1976, Oct 14, Menlo Park, CA

Sponsor: Stanford Res Inst, Fire Prot Eng Group

The desirable features of a fire control simulation system to train firefighters realistically while complying with the constraints of the cost of firefighters' hours, environmental concerns, reduced number of serious fires in many jurisdictions, and other factors, are outlined in evaluation of the preceding paper on "Aircraft Crash Fire Training Aids." 5 pages.

7. FIRE SERVICE ORGANIZATION AND FACILITIES

c. FACILITIES

1355. Lubitzsch W
THE DRAEGER TEST STAND FOR COMPRESSED-AIR BREATHERS, ANOTHER TOOL FOR BREATHING APPARATUS MAINTENANCE CENTERS
Draegerheft; (307):17-20, 1977 (German)

A workshop apparatus is described which makes it possible for breathing apparatus centers in which repairs and overhauls are carried out in addition to the usual maintenance to undertake all the subsequent required tests. The structure, operating principle and range of application of the test stand are illustrated in detail and the practical use of the apparatus is demonstrated using examples. 4 figs. (Fachdok 13/0792)

1356. Lyakishev V
CENTRAL HOSE MAINTENANCE STATION
Pozhar Delo; (4):24-25, 1977 (Russian)

Centralized maintenance of fire hoses has proved to be economical, as illustrated by the example of the central fire hose maintenance station in Kalinin (USSR). The hoses are cleaned in a universal drum washing machine, are checked and dried. The hoses are then coiled using a simple mechanism and are stored in racks. The lifeline of hose has been increased appreciably by the centralized method and space has been saved in the fire stations. (For a related article in this issue of *FTA* see the Source Index under "Journals," *Pozhar Delo* (3): 28-29, 1977.) 3 figs. (Fachdok 13/1235)

1357. Orlov V
EXCELLENT EQUIPMENT MAINTENANCE
Pozhar Delo; (5):24-25, 1977 (Russian)

The status of fire equipment maintenance work in the Soviet fire brigades is examined. Examples are cited for the establishment of technical maintenance stations for fire apparatus, hoses, and communications equipment. The principal deficiencies in servicing fire equipment are identified as delayed maintenance of fire apparatus and poor drying of hoses. (RZh)

1358. Zakomornyy A
AN IMPORTANT RESERVE IN REDUCING THE FIRE HAZARD
Pozhar Delo; (3):28-29, 1977 (Russian)

A central hose maintenance station has been put in operation in the city of Kalinin (USSR). All the brigade's hoses have been transferred to this station except for one set in each fire apparatus. All kinds of work are done at the center, such as cleaning, testing for strength, drying, taling, coiling and, if necessary, repair and attachment of hose connections. With 24-hour service, the center can handle 72 hoses of 77 mm dia or 120 hoses of 51 mm dia. The individual hose maintenance assemblies are described. (For a related article in this issue of *FTA* see the Source Index under "Journals," *Pozhar Delo* (4):24-25, 1977.) (RZh)

1359. Alger RS [Stanford Res Inst, Menlo Park, CA]
AIRCRAFT CRASH FIRE TRAINING AIDS
Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA
 Sponsor: Stanford Res Inst, Fire Prot Eng Group

This report is concerned with the development of techniques and facilities to enhance firefighter training while ameliorating the undesirable effects on the environment from training with, eg, set fires, (smoke release). The scope of the report covers questions governing the training program and associated facilities, namely, the type of training required, personnel to be trained, amount of training per man or crew, location of training and scheduling, and compatibility of training with environmental constraints. The training aids are described (spray water pool fire and aircraft mockup, cold fire training pit, fuselage fire trainer, engine fire simulator, and cascading fuel trainer), as are the three facility designs (spartan, modest, and sophisticated) which were devised to meet environmental impact constraints. 39 pages, 15 figs, 1 table.

d. FIRE APPARATUS

1360. Ditzel PC
FROM HAND TUBS TO SUPER PUMPER
Fire Eng; 130(11):25, 27-30, 1977

The history of the development of pumpers in the United States, from the steam fire engines of the 1870s to the Super Pumper of the New York City Fire Department, is reviewed. 8 photos.

e. INFORMATION SYSTEMS

f. INSPECTION

1361. Kramerov N
MORE ABOUT ADMINISTRATIVE PRACTICES
Pozhar Delo; (3):28-29, 1977 (Russian)

Considered in this article are measures taken by the Fire Service Administration of a number of provinces to increase the level of legal knowledge among fire service personnel. Cases are pointed out in which personnel of the State Fire Inspectorate (USSR) incorrectly imposed fines, because they were not guided by the requirements of title 4 of the Statute on the State Fire Inspectorate to apply punitive measures only when there is a distinct danger of outbreak of a fire. (RZh)

1362. Anon
THE FIRE PREVENTION INSPECTION: A WALK FOR SURVIVAL
Record; 54(3):8-11, 1977

The fire prevention inspection is one of the basic functions associated with automatic sprinkler systems, with fire protection equipment, and with the elimination of fire hazards. Of these, determining that all sprinkler control valves are open is the most important. Some of the activities expected of the weekly inspector, including the knowledge of sprinkler systems needed by the inspector, and some of the pitfalls which might be encountered are discussed. 8 figs.

g. INVESTIGATION AND REPORTING

1363. Yip IHL and Clair EG
A RAPID ANALYSIS OF ACCELERANTS IN FIRE DEBRIS
Can Soc Forensic Sci J; 9(2):75-80, 1976

7. FIRE SERVICE ORGANIZATION AND FACILITIES

g. Investigation and Reporting—Continued

A system has been developed for the identification of trace amounts of petroleum products from the debris of fires using a Bentone 34 + Di-isodecylphthalate (DIDP) column. Samples were obtained in the vapor state by the following three methods: 1) headspace sampling at room temperature; 2) headspace sampling after heating in an oven; and 3) sampling from the condenser during distillation. Gasoline and naphtha can be readily differentiated from other accelerants and contaminants. A large percentage of arson cases require no further examination than the oven heating method followed by GC analysis. 4 figs, 3 tables, 12 refs. (Author)

1364. Redzic D

NEW METHOD OF EVALUATING, COLLECTING, AND PROCESSING STATISTICAL DATA ON FIRE AND EXPLOSION DAMAGES

Protivpozarna Zastita; 17(1):21-25, 1977 (Serbocroatian)

The most recent questionnaire for fire and explosion statistics, which has been used in Yugoslavia since Jan 1, 1976, in accordance with the law of statistical investigations, is discussed. The questionnaire contains 19 entries relating to the usual data on premises that have experienced fires; namely, insurance, cause of fire or explosion, fire detection, fire alarm, fire behavior, response of the fire department, material damages, injuries and fatalities, etc. Not included are data on sprinklers and other fire extinguishing systems. Direct and subsequent damages are not listed separately. (Fachdok 13/0858)

h. PERSONAL EQUIPMENT

1365. Warncke E

BREATHING MASKS AND PROTECTIVE HELMETS

Draegerheft; (307):11-15, 1977 (German)

It is demonstrated why it is expedient to combine the separate safety devices used for breathing protection, namely, the protective helmet and the mask, to form correlated parts. On the basis of earlier suggestions on the part of the Den Haag Fire Department (the Netherlands) and developmental desires of the US Bureau of Mines, the Draeger breathing apparatus helmet was developed, which is presently undergoing practical testing in the Den Haag Fire Department. The helmet can be worn without a mask or breathing apparatus. If breathing protection is required, the mask belonging to this helmet can be set into position on the helmet and can be drawn airtight against the face by means of handwheels on the side. 7 figs, 4 refs. (Fachdok 13/0839)

1366. Anon

BREATHING PROTECTION DATES BACK TO THE ROMANS

Fire Eng; 130(11):40-42, 45, 1977

A brief history of the development of breathing apparatus is given. 2 figs, 6 photos.

1367. Anon

FIRE AND PERSONAL PROTECTION

Nat Saf News; 116(5):62-64, 1977

Clothing designed to protect the firefighter against heat, sparks, and fire of low intensity (leather and asbestos); hot metal, radiant heat, and flame hazards of somewhat

higher intensity (asbestos and wool); clothing of reflectorized fabrics (Nomex and Kevlar); fire entry and fire proximity suits, turnout suits, gloves, footwear and the like, are described and requirements are outlined. The need for protective apparel to be reasonably economical, reasonably long-wearing, and easy to put on in a hurry is emphasized. 3 photos, 5 refs.

1368. Labella JML

CONTRIBUTION TO A COMPARATIVE STUDY OF THE TRANSMITTANCE OF DIOCTYLPHTHALATE, SILICA DUST, SILICA MIST AND LEAD SMOKE IN THE AEROSOL FILTERS OF BREATHING APPARATUS

Staub; Reinhaltung der Luft; 37(5):178-183, 1977 (German)

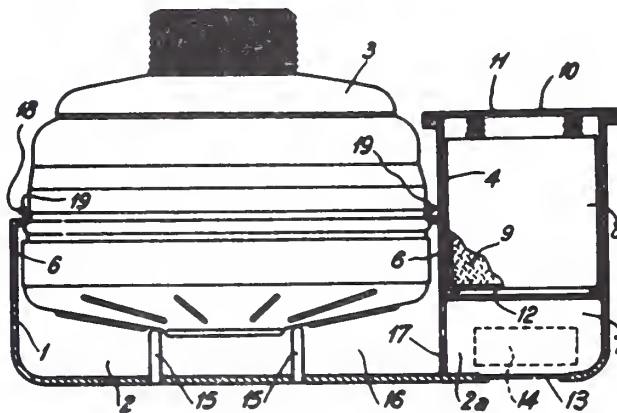
A comparison was made of four different filter types using destructive test aerosols (silica dust, lead smoke and silica mist) and the nondestructive aerosol dioctylphthalate (DOP). The tests were aimed at demonstrating how sensitively an increase in transmittance of fillers with a corroded surface can be detected as compared to a noncorroded surface. The usefulness of the DOP test for rapid quality controls with adequate sensitivity is shown, provided comparative studies of the filters in question have been made prior to the quality control. 9 figs, 2 tables, 5 refs. (Fachdok 13/0870)

1369. Brauer L

ADDITIONAL FILTER FOR BREATHING MASK

French Patent No. 2,322,618; Cl A62B 23/02, 18/08, Appl 8 Sep 1976, Discl. 1 Apr 1977, Priority: FRG, No. P 25 40 314.9, 8 Sep 1975, Assignee: Auergesellschaft GmbH, FRG

The invention relates to an additional filter for the breathing filter of a breathing mask comprising a container with a covered receptacle holding a filter canister containing a filtrant, with attachment members for a breathing filter, a fixed or exchangeable window disposed in the receptacle or opposite the receptacle, near the air outlet



side of the filter canister with a device indicating exhaustion of the filtrant above this window. The filter is novel in that the container is flat in structure, in the

7. FIRE SERVICE ORGANIZATION AND FACILITIES

h. Personal Equipment—Continued

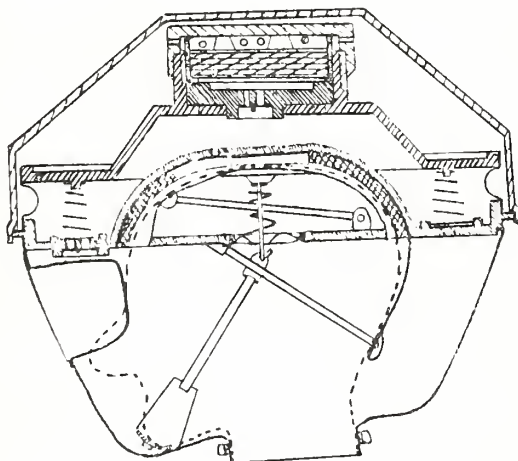
shape of a tray with a crosswise partition dividing it into two compartments having openings near the bottom. The rounded end of the partition form a gas-tight compartment to hold the breathing filter. The other compartment is shaped to receive a filter canister, which rests on pegs so as to create a cavity between the air inlet of the filter and the air outlet of the receptacle. 4 claims, 2 drawing figs.

1370. Remlinger F

BREATHING MASK WITHOUT DECREASE IN PRESSURE

French Patent No. 2,324,320; Cl A62B 17/04, Appl 16 Sep 1975, Discl. 15 Apr 1977, Assignee: Inventor

The invention concerns a mask for protection of the lungs and eyes against dust and toxic gases with air inhalation without a drop in lung pressure, air being aspirated through the filter by means of an aspirator and force pump of variable volume surrounding the head of the wearer, the top side of the pump being movable. The driving force required for operation of the pump is provided by the alternating action of lowering and raising the lower jaw relative to the upper jaw, the force generated by this action being transmitted via a chin strap to the movable portion of the pump. 12 claims, 1 drawing fig.



1371. Lockheed Co

SELF-HELP BREATHING APPARATUS

French Patent No. 2,321,909; Cl A62B 7/08, 11/00, Appl 30 Dec 1975, Discl. 25 Mar 1977, Priority: US, No. 608,723, 26 Aug 1976, Assignee: Lockheed Missiles and Space Co

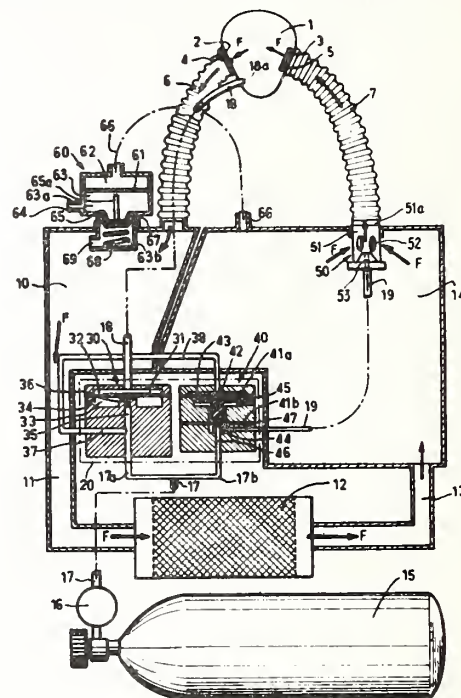
For a description of this patent see the abstract for US Patent 4,019,509 in this issue of FTA by consulting the Source Index under "Patents."

1372. Spirotechnique Ind et Commere

CLOSED CIRCUIT BREATHING APPARATUS

French Patent No. 2,323,403; Cl A62B 7/00, Appl 15 Sep 1975, Discl. 8 Apr 1977, Assignee: La Spirotechnique Industrielle et Commerciale

Disclosed is a breathing apparatus comprising a mask having an expiration and an inspiration orifice, an expiratory cavity communicating with the first orifice via an expiration pipe to receive the exhaled air, a regenerator connected with the cavity through which the stale air passes, an inspiratory cavity connected to the regenerator to receive regenerated air as well as to the second orifice by an inspiration pipe, a pressurized fresh-air source and means for introducing the air from this source into the closed respiratory circuit formed by the mask, the cavities and the regenerator and for forcing the regenerated air to circulate in this circuit, novel in that the means cited above have a control device connected to the outlet of the fresh-air source which is sensitive to the respiratory pressure in the mask and air feed device communicating with the inspiratory cavity and supplied by the source via the control device. 8 claims, 1 drawing fig.



1373. Eckstein W and Rundshagen A

BREATHING FILTER WITH LEAD SEALS

FRG Patent No. 2,542,460; Cl A62B 23/02, Appl 24 Sep 1975, Discl. 7 Apr 1977, Assignee: Draegerwerk AG, Luebeck

The invention relates to breathing filters with lead seals, distinctive in that the seals consist of a plug enclosed in a hand-manipulated ring, the ring being displaced 180° relative to the hand manipulator and being firmly con-

7. FIRE SERVICE ORGANIZATION AND FACILITIES

h. Personal Equipment—Continued

nected to the plug via a bridge and at several other points via readily breakable lead fillets, the seal material proper being plastic. 2 claims, 3 drawing figs.

1374. Geissler R and Kopp G von
DEVICE FOR TESTING THE TIGHTNESS OF A PROTECTIVE BREATHING MASK AND ITS EXHALATION VALVE

FRG Patent No. 2,550,594; Cl A62B 27/00, G01M 3/02, Appl 7 Nov 1975, Discl. 18 May 1977, Assignee: Auer-gesellschaft GmbH, Berlin

The invention concerns a device for testing the tightness of seal of a protective breathing mask and its exhalation valve, consisting of a part for connecting the device to the inhalation connective piece of the mask, a hose connected to the part, a three-way pipe, one opening connected to the hose, a pressure gage connected to the second opening, a pipeline which is connected to the third opening, and a pump (hand pump) connected to the pipeline, distinctive in that the pipeline is made as a flexible hose forming the only connection between the three-way piece and the pump. The pressure-side connection of the pump can be connected to an inflatable bell onto which the mask can be drawn. 11 claims, 1 drawing fig.

1375. Schaerer O and Fehr R
PROTECTIVE BREATHING MASK

FRG Patent No. 2,645,151; Cl A62B 18/00, Appl 6 Oct 1976, Discl. 21 Apr 1977, Priority: Switzerland, Conv No. 13194-75, 10 Oct 1975, Assignee: Luwa AG, Zurich, and Hubr u. Luhner AG Kobel-, Kantschuk-, Kunststoffwerke, Pfoeffiken

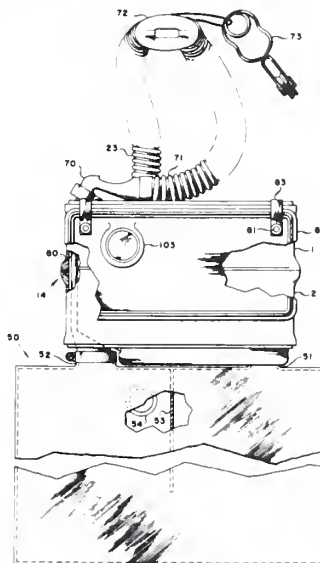
The invention concerns a protective breathing mask with a facepiece that has a connective adapter with interior threading disposed to the side of the chin part and with an air filter which is exchangeably attached to the connective adapter via a connective piece provided with external threading, distinctive in that the connective piece is off-centered on the filter relative to the axis passing through the center of gravity of the filter, that the air filter with its center of gravity is displaced toward the rear edge of the facepiece relative to the connective adapter and has at least one releasable brace engaging the facepiece and is displaceably disposed opposite the connective piece on the center of gravity. 17 claims, 7 drawing figs.

1376. Li Y-S, Leon RC, Sr and Perry EN
SELF-RESCUE BREATHING APPARATUS

US Patent No. 4,019,509; Cl 124/147, (A62B 7/08), Appl 28 Aug 1975, Discl. 26 Apr 1977, Assignee: Lockheed Missiles and Space Co, Inc, Sunnyvale, CA

An impact-resistant external casing is provided to enclose a canister containing a multi-layered chemical bed, with bypasses in each layer to accommodate the flow across and through the bed of exhaled breath which reacts with potassium superoxide in tablet form, the casing being provided with a (top) lid section which contains a mouthpiece, breathing hoses, and neck straps, the opposite side of the casing being provided with a bottom cover which accommodates the storage of a folded breathing bag and chest straps. An air passageway constituting an annular section is provided to accommodate a chimney extending from the bag through the passageway

section between the casing and the canister, which is open to ambient air for cooling purposes. The inside bottom portion of the canister is provided with a trammel to prevent escape of deliquesced KO(2), and the breathing bag is characterized by having a single baffle, forcing air through the bag in such manner as to take air as far from the heat of the canister as is possible. The case is provided with a moisture indicator which functions to indicate the presence of moisture, and therefore warn of any leaks that may have occurred in the case and, through the mouthpiece into the canister, which would cause premature reaction of the KO(2) and render it unsuitable for use. 11 claims, 13 drawing figs. (Author)



1377. Martin FE, Colston JR and Smith NE
BREATHING APPARATUS

US Patent No. 4,016,876; Cl 128/142 R, (A62B 7/02), Appl 30 Jul 1975, Discl. 12 Apr 1977, Assignee: Westinghouse Electric Corp, Pittsburgh, PA

A breathing apparatus is disclosed which incorporates a sensing device operable to adjust the amount of breather's exhaled gas captured in a gas collector section as a direct function of the carbon dioxide content of the exhalation. The amount of exhaled gas captured is sufficiently low in carbon dioxide (CO₂) content to permit rebreathing on the next inhalation, at which time the sensor again adjusts the volume of exhaled gas to be captured. In the one embodiment, a firefighter's breathing system is described wherein the gas collector section is integral with the breathing mask worn by the firefighter. 4 claims, 10 drawing figs. (Author)

1378. Oetjen GW and Warncke E
PROTECTIVE BREATHING DEVICE HAVING A FILTERING APPARATUS AND ADDITIONAL OXYGEN SUPPLY FOR EMERGENCY USE

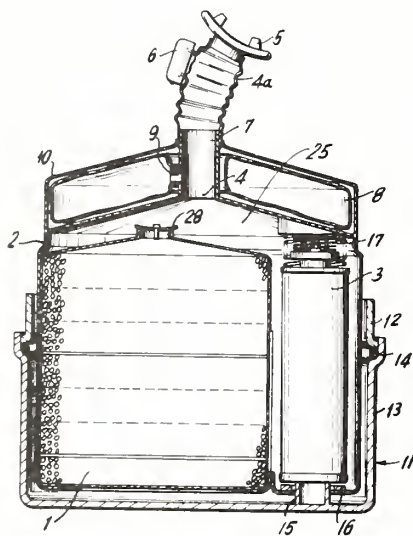
US Patent No. 4,019,507; Cl 128/142 R, (A62B 7/08), Appl 24 Sep 1974, Discl. 26 Apr 1977, Priority: FRG,

7. FIRE SERVICE ORGANIZATION AND FACILITIES

h. Personal Equipment—Continued

No. 2446410, 28 Sep 1974, Assignee: Draegerwerk AG, Luebeck, FRG

A protective breathing device comprises a housing having a filter therein and with an inlet air passage through the filter and through an internal passage in the housing to a breathing tube having a mouthpiece which is adapted to be fitted to the wearer. The breathing tube includes an exhaling valve for expelling air which is exhaled through the breathing tube. The housing carries an oxygen cartridge which is fired or opened by a firing pin which penetrates the cartridge in order to supply oxygen into the housing passage for flow through the breathing tube when this is necessary. In addition, the housing has an annular chamber surrounding the inhalation duct carrying an economy bag through which portions of the exhaled air may be recirculated for flow back into the breathing tube on a successive respiration in order to maintain the oxygen content within acceptable limits. 5 claims, 4 drawings. (Author)



1379. Burgess WA, Sidor R, Peterson N, Buchanan P and Clougherty E
DESIGN SPECIFICATIONS FOR RESPIRATORY BREATHING DEVICES FOR FIREFIGHTERS. Harvard School Publ Health, Boston, MA; DHEW/PUB/NIOSH-76/121, 76 pages, Sep 1976
Availability: NTIS PB-267 463/8GA

The desired protective factor for self-contained breathing apparatus used in the fire service is proposed at 100 based on a series of tests with a personal air sampler which revealed maximum air concentrations of carbon monoxide of approximately 20,000 PPM during firefighting episodes. A series of 74 incidents was studied using a combustible gas detector modified to be specific for carbon monoxide. The data are recorded on a cassette recorder using a voltage-to-frequency converter. A study of the respiratory minute volume during active work while

wearing open-circuit, self-contained breathing apparatus indicated a median value of 60 liters per minute and 70 liters for the 80 percentile group. If the device is to have a service life of 30 minutes, the stored air capacity must be 1800 liters, and 2100 liters for the median and 80 percentile values, respectively. (Author)

I. PERSONNEL AFFAIRS

1380. Kochan TA, Ehrenberg RG, Baderschneider J, Jick T and Mironi M
AN EVALUATION OF IMPASSE PROCEDURES FOR POLICE AND FIREFIGHTERS IN NEW YORK STATE. NY State School of Indust and Labor Relations, Ithaca, NY; NSF/RA-770101, 504 pages, Jan 1977
Availability: NTIS PB-269 663/1QA

This study evaluates the impact of a change in the impasse resolution procedures on the process and outcomes of collective bargaining for police and firefighters in New York State. The study considers: 1) the change in the impasse procedure from factfinding followed by a legislative hearing to conventional compulsory arbitration; 2) its effect on the ability of the parties to reach agreements in negotiations without an impasse or in mediation; and 3) its effect on the level and/or distribution of wages and other terms of employment. Experiences in 133 sets of police and firefighter negotiations during the last round of bargaining under the factfinding statute are compared with experiences in the first 118 negotiations under arbitration. Data were collected in personal interviews with the negotiators, mediators, and members of the arbitration panels in these cases. (For a related article see abstract 964 in FTA 2(3).) (Author)

1381. Davidson NB [Portland Civil Service, OR]
DATA SUPPORTS TOP AGE LIMIT FOR RECRUITS
Fire Eng; 130(12):43, 45-46, 1977

The concern of the fire service with regard to maximum hiring age limit must be the possible one-time disruption of a vital service caused by the failure of a firefighter to function properly due to an age-related physiological malfunction. An analysis of the relationship between age and performance-limiting physical impairments, based on records of the Portland (OR) Fire Bureau, supports the widely held belief that an entry level maximum age standard is job-related for the fire service. Records showing instances of cardio-vascular failure and the frequency and severity of injuries for Portland firefighters were examined, and are compiled in three tables. Injuries from nonalarm activities were omitted. These data lend support to a bonafide occupational qualification exclusion from the Federal Age Discrimination in Employment Act. It is concluded that a maximum hiring age of 30 for entry into the fire service supports the objective of providing the public with the highest level of protection service. 3 figs.

1382. List WF
THE RESPIRATION — CIRCULATION PERFORMANCE TEST AS A SAFETY INVESTIGATION FOR FIREFIGHTERS
Steir Feuerwehrbl; 26(3):4-5, 1977 (German)

7. FIRE SERVICE ORGANIZATION AND FACILITIES

i. Personnel Affairs—Continued

Extracts from a paper given at a conference of the Fire Service Doctors of Styria (Austria) on the performance of firefighter tests are presented. Studied were the breathing and pulse rate, blood pressure, the gas content in the blood and EKG, before and after 5 min of exercise, recorded using a bicycle ergometer. Examined were 2,500 men. After the exercise, about 1/6 of the men examined showed an increase in pressure, about 3% exhibited coronary insufficiency, and about 3% functional irregularities in the lungs. (RZh)

1383. Wasylenko MJ [Univ Wisconsin, Madison, WI, Dept Urban and Regional Planning]

SOME EVIDENCE OF THE ELASTICITY OF SUPPLY OF POLICEMEN AND FIREFIGHTERS

Urban Affairs Quart; 12(3):365-382, 1977

An attempt is made to provide researchers and policy makers with some evidence on the magnitude of the elasticity of supply of police and firefighters. The paper is divided into five sections. In the first section the existing evidence on the determinants of the wages of local government employees is reviewed; next, a model of the demand and supply of public employees in each public function is formulated. The estimation method used to estimate the empirical model is discussed, and the results of the estimation are reported in the third section. The fourth section contains some implications of these results for other research on the levels of wages and employment in local governments and grants-in-aid to local governments. Section five contains the conclusions. 1 table, 29 refs.

1384. Anon

POLICE, FIRE, AND REFUSE COLLECTION AND DISPOSAL DEPARTMENTS: MANPOWER, COMPENSATION, AND EXPENDITURES

Urban Data Service Report; 9(7):1-13, 1977

This report examines manpower, compensation, and expenditures for the three major uniformed services (police, fire, and refuse collection and disposal) in US municipalities of 10,000 and above inhabitants. Data are based on responses to a mail survey conducted in January, 1977, by the International City Management Association. Analysis of the results reveal that from 1 January 1976 to 1 January 1977 the rates of increase in average entrance and maximum salaries of police officers, firefighters, and refuse collectors were lower than those for the period 1 January 1975 to 1 January 1976. Geographically, western cities pay the highest average entrance and maximum salaries with longevity for police, fire, and refuse collectors. Suburban municipalities pay higher average entrance and maximum salaries and maximum salaries with longevity than do other city types. The average number of full-time paid personnel (uniformed and nonuniformed) is 152 for police, 109 for fire, and 79 for refuse collectors. The average number of full-time paid personnel (uniformed and nonuniformed) per 1000 population is 2.67, 1.67, and 1.06 for police, fire, and refuse collectors, respectively. For all three services, the average number of years of service required to reach the maximum salary is 4. 18 tables. (Author)

1385. Stuntz SE [Stanford Res Inst, Menlo Park, CA]

HUMAN FACTORS PROBLEMS IN THE FIRE SERVICE
Fire Protection Technology Seminar, Annual, Second, Proc;

1976, Oct 14, Menlo Park, CA

Sponsor: Stanford Res Inst, Fire Prot Eng Group

Selected problems in three areas basic to the performance of jobs in the firefighting profession are identified and discussed: 1) selection of applicants; 2) initial recruit training and retraining of firefighters to maintain proficiency; and 3) human engineering design of firefighting equipment and apparatus to facilitate operation and maintenance. 16 pages, 2 figs, 10 refs.

J. PUBLIC RELATIONS

K. TOOLS, APPLIANCES, AND GENERAL EQUIPMENT

1386. Ditzel PC

CENTURY OF DEVELOPMENT FOR AERIAL LADDERS
Fire Eng; 130(11):32, 35-37, 1977

The history of the development of aerial ladders in the United States is reviewed. 2 figs, 7 photos.

1387. Anon

COLLAPSIBLE CONTAINERS: TACTICAL CONSIDERATIONS

Fire Internat; 5(56):85-86, 1977 (English, French, German)

The use of collapsible containers, open or closed, with or without funnel connections, for the transportation of extinguishants, water relays, oil and chemical spillage removal, and other salvage operations is discussed. The containers should not be too large: two 5000 l containers are much easier to handle and use than one 10,000 l container, with less strain on the material. Several funnels speed up operations.

1388. Anon

US FIREFIGHTERS DEVELOP NOVEL FOAM GUN

Fire Internat; 5(56):73-74, 1977 (English, French, German; Spanish Summary)

A novel high-capacity foam gun has been developed by the Portland, Oregon, Fire Department to put out a heavier volume and to project the stream for protection of large volumes of petroleum products in the port. Four pick-up tubes were attached in parallel to a hydrant top casting as base with a 2 1/2 in. coupling for water supply. A plate with metering orifices was brazed to the plate. Foam solution enters at a quick-disconnect coupling serving all four tubes. Horizontal stream reach is about 170 ft. The nozzle will throw foam over the top of a six-story building. Two guns are mounted on fixed pumper turrets; two will be used with deck nozzles on fire boats. 1 photo.

1389. Gurman E

INSERT BETWEEN LARGE HOSE LINES

Pozhar Delo; (5):29, 1977 (Russian)

The Lvov Fire Brigade (USSR) has developed an insert for a 150-mm large hose line to make it possible to introduce and proportion foam concentrate, which is supplied by a pump from a foam extinguishing apparatus.

7. FIRE SERVICE ORGANIZATION AND FACILITIES

k. Tools, Appliances, and General Equipment—Continued

The insert contains one stub pipe for the foam concentrate and two 66-mm stub pipes through which water or foam solution can be tapped. (RZh)

1390. Freymond G

FIRE-FIGHTING EQUIPMENT MARKET STABLE

Usine Nouvelle; (2):26-27, 1977 (French)

A brief report is made of the commercial status of French companies producing firefighting equipment, export figures and prospects for the future. The production rates and turnover of several selected companies for 1976 are cited, from among the 90 enterprises belonging to the French Fire-Fighting Equipment Federation (Federation Francaise du Materiel Incendie), notably, the Camiva Company (80% of the French market for apparatus), Echelles Riffaud (ladders, extinguishers), the Compagnie Centrale Sicli (extinguishers and fixed installations), the Societe Continentale de Materiel d'Incendie (sprinklers), SGPI (detection), and SGEI (smoke removal).

1391. Michard J

SPIRAL JET WATER NOZZLE

French Patent No. 2,318,684; Cl B05B 1/02; A62C 31/02, Appl 2 May 1975, Discl. 25 Mar 1977, Assignee: Inventor

The invention relates to water nozzles with spiral jets. The nozzle comprises a circular piece with the end in the shape of a truncated cone fixed to a base, all in a piece of coaxial tubular shape with an orifice forming a nozzle; spiral grooves along the sides of the truncated cone and on the inside surface of the orifice and projection of the truncated cone section through the orifice induce spiral jets within solid secondary jets produced by the cylindrical orifices around the nozzle. 6 claims, 3 drawing figs.

1392. Sides Soc Ind

PUMPING DEVICE FOR FIREFIGHTING

French Patent No. 2,323,040; Cl F04D 13/14, A62C 25/00, Appl 8 Sep 1975, Discl. 1 Apr 1977, Assignee: Sides Soc Ind pour le Developpement de la Securite

The invention relates to a pumping device comprising at least two centrifugal pumping stages driven by a main shaft, the outlet of the first stage being connected to the inlet of the following stage, and at least two outlets for fluid under different pressures, distinctive in that at least one of the stages can be disconnected from the main drive axis. 5 claims, 2 drawing figs.

1393. DaRocha P

FOAM GENERATOR WITH VARIABLE ELEVATION AND DIRECTION

FRG Patent No. 2,644,483; Cl A62C 13/54, Appl 1 Oct 1976, Discl. 21 Apr 1977, Priority: France, No. 7530166, 2 Oct 1975, Assignee: Inventor

Disclosed is a foam generator for medium-expansion foam on a wheeled frame, distinctive in that the generator is borne by a parallelogram guide, one side of which forms the body of the foam generator while the other side forms the frame. The guide is so articulated on the front side of the frame and on the generator that the generator can be slued above and ahead of the front side of the frame. The guide is so designed that the vertical of the guide rods is exceeded by about 12° at the end

of their slue path, one guide rod of the parallelogram forming the supply line for the generator. The parallelogram grid is actuated by a cylinder-piston drive with a prescribed slue path. 5 claims, 2 drawing figs.

1394. Leuthner G

STOPPER FOR PRESSURIZED SPRAYER OR SPRINKLER

FRG Patent No. 2,551,182; Cl F16J 13/12, A62B 29/00, A62C 23/00, Appl 14 Nov 1975, Discl. 18 May 1977, Assignee: Deutsche Feuerloscher-Bauanstalt Wintrich u. Co, Bensheim

The invention relates to a filling stopper for pressurized spraying or sprinkling devices with a pressurized container to receive the spraying agent that can be closed by a filling stopper having a handling lever, valve mechanism, and spray or sprinkler nozzle by means of a gasket and can be pressurized by a gas, distinctive in that the filling stopper is designed as a bayonet catch whose bayonet base has at least two radially projecting locking bosses which can be axially inserted through conforming recesses in the bayonet socket and can be locked in grooved locking fixtures running circumferentially, and that the locking fixtures are divided into two sections axially displaced relative to each other and circumferentially meeting, the axial arrangement of the locking fixture sections being so designed that the gasket sealing the bayonet base against the bayonet socket, when the lock projections are engaged in the first axial inner lock fixture sections, tightly seals the filling stopper, but which, when displaced axially upon transition to the second axial outer lock fixture sections, is released from the sealing surface on one of the bayonet sealing parts so that the inside of the pressurized container communicates with the ambient atmosphere.

1395. Erickson LG and Erickson WS

WATER JET PROJECTOR

UK Patent No. 1,474,941; Cl B2F, A1D, A5A (B05B 7/04, F15D 1/02, F04B 9/10), Appl 1 May 1974, Discl. 25 May 1977, Assignee: LG Erickson, Palo Alto, CA

This invention relates to a water jet projection apparatus to achieve maximum range of application of the hydraulic power inherent in a stream of water, as in firefighting applications. The apparatus comprises a tubular body having a longitudinal axis and means at one end of the body defining a circular water outlet orifice, the opposite end of the body being adapted to be coupled to a source of water under pressure, an elongated needle having a transversely circular cross-section and provided with an enlarged portion, each portion of the needle on opposite ends of the enlarged portion tapering away therefrom symmetrically about the longitudinal axis thereof, means shiftably mounting the needle in the body with one of the end portions of the needle extending at least partially through the orifice, the mounting means permitting the needle to move into substantially coaxial alignment with the orifice when water flows through the body and out of the orifice, and means coupled with the body for injecting a friction-reducing agent through an opening communicating with the body for mixture with the water flow through the body to decrease the friction between the aqueous boundary layer of water flow and the inner surface of the body. 37 claims, 8 drawing figs.

8. FIREGROUND OPERATIONS

8. FIREGROUND OPERATIONS

a. COMMUNICATIONS AND SIGNALLING

1396. Numakura Y, Igarashi O, Takahashi H, Miyashita T, Hayashi T and Matsuo N
AUTOMATIC COMMAND COMMUNICATIONS SYSTEM IN THE YOKOHAMA MUNICIPAL FIRE DEFENSE BUREAU
NEC Res and Dev; (44):68-76, 1977 (English)

Title only available.

b. EVACUATION AND RESCUE

1397. Kawaguti N and Okamatsu S
PLAN FOR EMERGENCY EVACUATION FROM A CLUSTER OF MULTI-STORY BUILDINGS
Suchiro Dezain; (162):39-42, 1977 (Japanese)

A report is made on the use of digital computers to devise an optimal plan for the evacuation of people from the new Ashiyakama (Tokyo) development, which consists, for the most part, of multi-story buildings. The program algorithm was set up on the basis of the principle that the evacuation route for each building was independent; then the results of machine analysis were superimposed. It was found that many evacuation routes coincided for two or more buildings and were combined, thus requiring a greater route capacity. A comparative timing of evacuation for one and the same routes, calculated by different methods, as well as for various evacuation routes from the same building, is presented. 6 figs. (RZh)

1398. Morlack G and Wiesemes J
METHOD AND APPARATUS FOR RESCUING PEOPLE FROM TALL BURNING STRUCTURES
FRG Patent No. 2,547,226; Cl A62B 5/00, Appl 22 Oct 1975, Discl. 5 May 1977, Assignee: Inventors, Karlsruhe and Wuppertal

A patent is disclosed for a method and apparatus for rescuing people from tall burning structures, distinctive in that the apparatus consists of a fire-resistant, yielding, rapidly hardening foam which is laid as a heap of foam around or against the burning structure and in that people trapped by the fire jump into the heap of foam from great heights and can be rescued without major injury. The heap of foam is laid so as to form an oblique plane falling away from the structure, the heap of foam being continuously wetted with extinguishant, eg, water. The surface of the foam is provided with luminescent paint to be luminous in the dark. 5 claims, no drawing figs.

c. HYDRAULICS AND WATER FLOWS

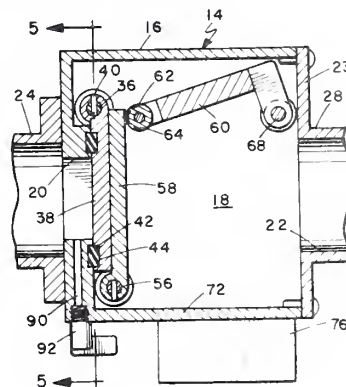
1399. Bagniers R
MICRO-TURBINE ACCELERATOR FOR WATER CONDUITS
French Patent No. 2,321,607; Cl F03B 3/04; A62C 31/00, Appl 18 Aug 1975, Discl. 18 Mar 1977, Assignee: Inventor

The aim of the present invention is to use a micro-turbine operating as an inverse turbine to increase the mass flow rate of water in a conduit, applicable, eg, for long-distance water pumping purposes in firefighting. Ac-

cording to the invention, one or several low-power turbines (eg, less than 4 KVA) are connected between two pipe sections, each turbine incorporating an electric motor housed entirely within the fixed-vane distributor of the turbine, the annular water circulation area defined between the housing of the turbine on the one hand and the distributor on the other hand being of essentially constant cross section, preferably equal to the cross section of the pipe. 3 claims, 3 drawing figs.

1400. Carlin JM
DELAYED RELEASE VALVE
US Patent No. 4,022,421; Cl 251/74, (F16K 31/44), Appl 1 Dec 1975, Discl. 10 May 1977, Assignee: Inventor, Del Mar, CA

The invention is a delayed release valve for a fire hydrant which permits the fireman to couple a fire hose with the valve in place to a fire hydrant, the valve being released subsequent to the coupling operation either by a timer which is set at the time the hose is attached, or by a radio-controlled servo mechanism so that the fireman who makes the hose attachment may proceed to the site of the fire and need not wait at the hydrant until on-site firemen are ready for water. 6 claims, 5 drawing figs. (Author)



1401. Anon
GUIDE TO THE USE OF PORTABLE FLAMMABLE GAS DETECTORS. Fire Res Sta (UK), Build Res Estab; CP 33/77, 6 pages, 2 figs, 1 ref, Jul 1977

This guide on the use of portable flammable gas detectors is intended particularly for those concerned with estimating flammable gas or vapor concentrations (managers, engineers, Fire Service, etc), either on a regular basis or in emergencies. Its aim is to provide a broad background to the use and limitations of portable gas detectors. It in no way seeks to replace existing documentation either from the instrument manufacturers or from regulatory authorities. (Author)

8. FIREGROUND OPERATIONS

d. OPERATIONAL PROBLEMS: COMMAND AND CONTROL

1402. Higgins M and Nicholson R [Tyne and Wear Metropolitan Fire Brigade, UK]
EFFICIENT MOBILISING AS AN AID TO FIRE SAFETY
Fire; 70(Suppl):31-32, 1977

This paper was presented at the annual conference of the Institution of Fire Engineers (UK) held at Brighton on September 28-29, 1977. For a review of the paper, consult the Source Index under *Fire Eng J*, 37(108):31-33, 1977.

e. SPECIAL EQUIPMENT

1403. Morlack G and Wiesemes J
METHOD AND APPARATUS FOR FIGHTING FIRES AT INACCESSIBLE OR NOT IMMEDIATELY REACHABLE FIRE POINTS
FRG Patent No. 2,542,485; Cl A62C 3/00, Appl 24 Sep 1975, Discl. 7 Apr 1977, Assignee: Inventors

A method and apparatus are disclosed for fighting fires at inaccessible or not immediately reachable fire points, distinctive in that the apparatus consists of containers, eg, plastic, filled with highly effective fire-extinguishing substances, eg, agents forming fire-extinguishing foam, so that when these containers are destroyed, eg, by impact or decomposition, the fire-extinguishing substances are released, the containers being transported to the inaccessible or not immediately reachable fire points by means of unguided rockets, or rockets guided, eg, by wire or infrared radiation, from rocket launchers, by means of bombs or the like, the projectiles being capable of penetrating thin walls, eg, window panes, for improved firefighting. 1 claim, no drawing figs.

f. TACTICS

1404. Freeman M [Dallas Fire Dept, TX]
HIGH-RISE PLAN TESTED BY SIMULATED FIRE
Fire Command; 44(12):30-32, 1977

A fire was simulated in a 19-story, glass-wrapped, modern office building in Dallas, Texas, to solve the logistical, tactical and functional problems inherent in highrise building fires and to test a prefire plan. The results reaffirmed the conviction that techniques and methods of combatting highrise building fires must be continually reviewed, evaluated and modified as experience and technology dictate. Planning for the exercise, planning of specific operations, actual operations, evaluation and results comprise the detailed sections of the article. 3 photos, 2 tables.

1405. Wetterich W [Total Foerster, Ladenburg, FRG]
HIGH RATE DISCHARGE METHOD FOR RAPID EXTINGUISHMENT AND SUPPRESSION OF EXPLOSIONS
VFDB Z; 26(4):122-125, 1977 (German; English and French Summaries)

The historical development of the high-rate-discharge (HRD) method in fire and explosion protection is reviewed from the start in the 1930s to the present. Typical exam-

ples of HRD extinguishing systems for aircraft, vehicles, and flares are cited. Finally, the use of the HRD method for explosion protection and in flame arresters is mentioned. 3 figs, 4 refs. (Author)

9. PLANNING

a. BUDGETING

1406. Scofield ND [Liverpool Polytechnic, UK, Dept of Surveying]
HOW TO ASSESS THE COST
Fire; 70(Suppl):44, 1977

Evaluation of the cost of fire protection must take account of both capital and running costs, investment grants, insurance premiums, savings, water and other rates and the net savings in Corporation Tax. It is arguable that account also should be taken of such factors as potential savings in uninsured losses, disruptions to production flows during installation of the system and management time. Probably, however, most firms are mainly concerned with the impact of loss prevention measures on the cost of insurance. The costs and benefits of fire protection are summarized in separate sections of the paper devoted to installation and running costs, insurance premium rating, and investment incentives. 2 figs.

1407. Baird DM [Public Fire Protection Survey Services, Canada]
MUNICIPAL BELT TIGHTENING
Fire Fighting Canada; 21(5):6-7, 9, 1977

Arbitrary cutbacks in municipal fire department budgets in Canada risk increased fire losses and consequent related economic losses to the community. The fire department is vulnerable to such freezes and cutbacks because firefighting is a high-cost, labor-intensive operation in which productivity is hard to measure. Many are weak already in their ability to safeguard lives and property of the citizens. With Canadian fire losses already among the worst in the world, this prospect is unfortunate in a time requiring greater conservation of resources. The fire service must meet this challenge with good management techniques and development of a well-planned whole fire protection system employing building codes, public education, and any other factors bearing on the fire problem. Fire chiefs should not be stampeded by supposedly scientific assessments of fire protection requirements that do not have adequate technical input, but become involved in the evaluation process themselves. (Paper presented at the 69th Annual Canadian Association of Fire Chiefs' Conference held in Quebec on 22 August, 1977.) (Author)

1408. Seidel A [Albert Ziegler KG, Heidenheim, FRG]
A COMPARISON OF HOSE-DRYING COSTS
Fire Internat; 5(56):80-84, 1977 (English, French, German; Spanish Summary)

A comparison is made between the use of a hose tower, including a fully automatic hose-hanging apparatus, and a horizontal hose-drying installation for hose testing, cleansing, and drying. Diagrams show that the purchase costs for the technical equipment and the construction

a. Budgeting—Continued

costs do not give a complete picture. Expenses for running and personnel must be taken into account. The actual costs cannot be calculated exactly; approximate figures, which can be ascertained from the performance data provided by the manufacturer, should be sufficient. Usage must also be set against costs. The average quantity of hoses to be dried during one year must be calculated, taking account of spare hoses in need of drying after a major fire. Finally, it must be emphasized that in the fire service the economical aspects of an installation should not be considered more important than fulfillment of the required task. 5 figs, 3 photos.

1409. Anon

CALIFORNIA'S FIRE SERVICES POTENTIAL FOR DIS-ASTER. California Assembly Select Comm on Fire Services, Sacramento, CA; Unnumbered, 71 pages, Aug 1976
Availability: NTIS PB-268 688/9GA

The report in essence is a warning that firefighting services have not been adequately funded or improved in the US and that fire protection is on the verge of sliding into a potentially disastrous position. A plea is made for better education of the public and for improvement of the state of the art in fighting fires, without which needless loss of life and property will occur. (Author)

b. LOGISTICS

1410. Wiersma SJ [Stanford Res Inst, Menlo Park, CA]

OPTICAL ALLOCATION OF FIRE COMPANIES

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA
Sponsor: Stanford Res Inst, Fire Prot Eng Group

Considered in this paper is a model designed to examine a methodology for selecting the number of fire stations in a community to optimize fire protection and minimize fire suppression costs. Data for the examples are from Tucson, Arizona, for 1974 and 1975. The method is based on estimates of property and content losses as a function of the average response time of the first company to the alarms, both of which are calculated, as are fire suppression costs. The model is intended to assist communities in planning fire suppression needs. (The paper is followed by a three-page critique in which it is pointed out that the analysis fails to take into account other losses, namely, loss of life, as well as other factors such the types, density, and purpose of buildings and geographical factors.) 16 pages, 5 figs, 6 refs.

c. OPERATIONS ANALYSIS

10. HUMAN BEHAVIOR, SOCIAL, AND MEDICAL PROBLEMS

[For more complete coverage of the behavioral and medical literature see: *Psychology Abstracts* and *Index Medicus*.]

a. ARSON

1411. Anon

FIREFIGHTERS AS FIRESETTERS

112 Magazin fuer den Feuerwehrmann; 2(5):6-9, 1977 (German)

The firesetting phenomenon is on the increase, particularly in rural communities, where once again the firesetters are very frequently found to be members of the Volunteer Fire Departments. Eighteen cases that occurred in the State of Lower Saxony (FRG) in the period 1970-1976 in which firefighters were the firesetters are described. In most cases the motive was the need for self-assertion. Psychiatrists consider these culprits to be mentally disturbed. Dr. Sluga (forensic psychiatry, Vienna) urges that these cases from within the fire service ranks be investigated to permit establishment of criteria for a firefighters' qualification test. 1 fig. (Fachdok 13/0871)

1412. Grimes ME [Nat Fire Prot Assoc, Boston, MA]

THE NATIONAL PROBLEM OF ARSON

Fire J; 71(5):67-72, 103, 1977

The testimony of the author, NFPA Assistant Vice-President for Government Affairs, before the Subcommittee on Special Small Business Problems of the US House of Representatives Committee on Small Business, which held a series of hearings earlier in 1977 on crime and its effects on small business, is reported. The difficulties of detecting, investigating, and prosecuting the crime of arson, the major attention being devoted to the problem by various organizations, and the requirement of support and interest on the part of law enforcement agencies, the judiciary, and social agencies are identified as prime factors to be resolved in combatting arson.

b. COMBUSTION TOXICOLOGY

1413. Hilado CJ and Lopez MT [Univ San Francisco, CA, Fire Safety Center]

SCREENING MATERIALS FOUND IN THE HOME FOR POTENTIAL FIRE TOXICITY; Paper No. 1.2

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 89-127

Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see *FTA* 1(6), abstract 2308. 9 figs, 19 tables, 18 refs.

1414. Hilado CJ and Lopez MT [Univ San Francisco, CA, Fire Safety Center]

A TOXICITY STUDY OF THE PYROLYSIS PRODUCTS FROM SOME ELASTOMERS; Paper No. 8.3

Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 512-521

Sponsor: Univ San Francisco, Fire Safety Center

FIRE TECHNOLOGY ABSTRACTS

10. HUMAN BEHAVIOR, SOCIAL, AND MEDICAL PROBLEMS

b. Combustion Toxicology—Continued

For a review of this paper see abstract 2298 in *FTA* 1(6). 1 fig, 9 tables, 4 refs.

1415. Hilado CJ and Schneider JE [*Univ San Francisco, CA, Fire Safety Center*]
A TOXICITY STUDY OF THE PYROLYSIS PRODUCTS FROM A POLYURETHANE RIGID FOAM; Paper No. 8.4
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 522-531
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 2302 in *FTA* 1(6). 4 tables, 8 refs.

1416. Nunez LJ and Autian J [*Univ Tennessee, Memphis, TN, Center for Health Sci, Material Sci Toxicol Labs*]
TOXICITY STUDY OF FABRIC COMBUSTION PRODUCTS, CORRELATION OF EXPERIMENTAL VARIABLES; Paper No. 8.5
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 532-559
Sponsor: Univ San Francisco, Fire Safety Center

A toxicity study of the combustion products of a cotton twill fabric, a cotton flannel fabric, and a cotton/polyester blend, each untreated, treated with flame retardant, and topped with trimethylolmelamine, has recently been presented in the *Journal of Combustion Toxicology* (see abstract 1877, *FTA* 1(5)). The following presentation, a part of the study not included in the journal, is concerned with the correlations exhibited by the two scales of toxicity based on rat mortality with the experimental variables of the system. High multiple correlation coefficients have been obtained. The significance of carbon monoxide in the combustion products is discussed in terms of the carbon monoxide toxicity equivalent. 19 figs.

1417. Tsuchiya Y
SIGNIFICANCE OF HCN GENERATION IN FIRE GAS TOXICITY; Paper No. 8.2
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 494-511
Sponsor: Univ San Francisco, Fire Safety Center

For a review of this paper see abstract 546 in *FTA* 2(1/2). 1 fig, 3 tables, 41 refs.

1418. Hartung R, Ball GL, Boettner EA, Rosenbaum R and Hollingsworth ZR [*Univ Michigan, Ann Arbor, MI, School of Public Health, Dept Environ and Indust Health*]
THE PERFORMANCE OF RATS ON A ROTAROD DURING EXPOSURE TO COMBUSTION PRODUCTS OF RIGID POLYURETHANE FOAMS AND WOOD
J Combust Toxicol; 4(4):506-522, 1977

As part of a program to evaluate methods of behavioral testing applied to combustion toxicology, a rotarod apparatus and procedure have been developed to test the motor performance of rats exposed to thermal degradation products. Results are reported for nonflaming decomposition products from rigid polyurethane foams and Douglas Fir wood. The time-to-incapacitation endpoint can be made reproducible for a series of identical exposures if a strict run protocol is followed. A major advantage of the method is that a distinct endpoint is obtained which allows statistical evaluation of the data for comparative

purposes using relatively few animals. 9 figs, 4 tables, 14 refs. (Author)

1419. Hilado CJ, Cumming HJ and Solis AN [*Univ San Francisco, CA, Fire Safety Center*]
STUDIES WITH THE USF/NASA TOXICITY SCREENING TEST METHOD: OXYGEN CONCENTRATIONS WITH VARIOUS TEST CONDITIONS
J Combust Toxicol; 4(4):556-562, 1977

Continuing efforts to increase the versatility of the USF/NASA toxicity screening test method have included the use of different test conditions in order to simulate various fire environments. The use of air flow at flow rates of 16 to 48 ml/sec maintains oxygen concentrations above 19 percent throughout the 30 min exposure period, compared to above 16 percent without forced air flow. These levels of oxygen are well within the tolerance range of mice and approach the oxygen levels found in many real fire situations. Proposed minimum oxygen levels based on experience with rats are unduly restrictive on the use of other species such as mice, and tend to eliminate the cost savings, which may more than justify the selection of mice. 2 figs, 10 refs. (Author)

1420. Hilado CJ, Cumming HJ [*Univ San Francisco, CA, Fire Safety Center*] and Morford RH
POLYCHLOROPRENE FLEXIBLE FOAM AS A REFERENCE MATERIAL
J Combust Toxicol; 4(4):464, 1977

Polychloroprene flexible foam was evaluated as a reference material for fire toxicity tests. A commercial sample was evaluated using nine different test conditions of the USF methodology. The material exhibited a wide range of relative toxicity depending on the test conditions. Times to incapacitation and times to death were shortest at 16 ml/sec (1 l/min) air flow, at any fixed heating rate and upper limit temperature. 2 figs, 1 table, 8 refs. (Author)

1421. Hilado CJ, Kosola KL and Solis AN [*Univ San Francisco, CA, Fire Safety Center*]
EFFECT OF HEATING RATE ON TOXICITY OF PYROLYSIS GASES FROM SOME ELASTOMERS
J Combust Toxicol; 4(4):563-578, 1977

The effect of heating rate on the toxicity of the pyrolysis gases from 6 elastomers was investigated, using the screening test method developed at the University of San Francisco. The elastomers were polyisoprene (natural rubber), styrene-butadiene rubber (SBR), ethylene propylene diene terpolymer (EPDM), acrylonitrile rubber, chlorosulfonated polyethylene rubber, and polychloroprene. Changing from a rising temperature program (40°C/min) to a fixed temperature program (immediate exposure to 800°C) resulted in shorter times to animal responses. This effect is attributed in part to more rapid generation of toxicants. The rising temperature and fixed temperature programs produced exactly the same rank order of materials based on time to death. Acrylonitrile rubber exhibited the greatest toxicity under these test conditions, and carbon monoxide was not found in sufficient concentrations to be the primary cause of death. 1 fig, 6 tables, 5 refs. (Author)

10. HUMAN BEHAVIOR, SOCIAL, AND MEDICAL PROBLEMS

b. Combustion Toxicology—Continued

1422. Hilado CJ, Soriano JA and Kosola KL [Univ San Francisco, CA, Fire Safety Center]

EFFECT OF HEATING RATE ON TOXICITY OF PYROLYSIS GASES FROM SOME SYNTHETIC POLYMERS

J Combust Toxicol; 4(4):533-555, 1977

The effect of heating rate on the toxicity of the pyrolysis gases from some synthetic polymers was investigated, using the screening test method developed at the University of San Francisco. The synthetic polymers were polyethylene, polystyrene, polymethyl methacrylate, polycarbonate, ABS, polyaryl sulfone, polyether sulfone, and polyphenylene sulfide. Changing from a rising temperature program (40°C/min) to a fixed temperature program (immediate exposure to 800°C) resulted in shorter times to animal responses. This effect is attributed in part to more rapid generation of toxicants. The toxicants from the sulfur-containing polymers appeared to act more rapidly than the toxicants from the other polymers. It is not known whether this effect is due primarily to differences in concentration or in the nature of the toxicants. The carbon monoxide concentrations found do not account for the observed results. 1 fig, 6 tables, 17 refs. (Author)

1423. Hilado CJ and Cumming HJ [Univ San Francisco, CA, Fire Safety Center]

STANDARD WOOL FABRIC AS A REFERENCE MATERIAL

J Combust Toxicol; 4(4):454-463, 1977

A sample of standard wool fabric is considered as a possible reference material for quality control in test method development for toxicity screening at the University of San Francisco. The data obtained with this material are presented. 1 fig, 2 tables, 7 refs. (Author)

1424. Hilado CJ and Cumming HJ [Univ San Francisco, CA, Fire Safety Center]

EFFECT OF TEST CONDITIONS ON RELATIVE TOXICITY RANKINGS OF FIFTEEN MATERIALS

J Combust Toxicol; 4(4):487-498, 1977

Fifteen materials were evaluated for relative toxicity of pyrolysis effluents, using different test conditions in the USF methodology. Wool fabrics were consistently among the most toxic materials, and polystyrene and polychloroprene flexible foam were consistently among the least toxic materials. (Author)

1425. Hilado CJ and Cumming HJ [Univ San Francisco, CA, Fire Safety Center]

EFFECT OF MOUSE STRAIN ON RELATIVE TOXICITY OF PYROLYSIS GASES

J Combust Toxicol; 4(4):499-505, 1977

Swiss albino and ICR mice were exposed to the pyrolysis gases from wool fabric and bisphenol A polycarbonate, and times to specific responses were compared. On the basis of time to death, the ICR mice appeared to be slightly more susceptible to the pyrolysis gases from wool fabric, and slightly more resistant to the pyrolysis gases from polycarbonate. The differences observed in this study were not large enough to produce changes in relative ranking. 1 fig, 4 tables, 3 refs. (Author)

1426. Hilado CJ and Cumming HJ [Univ San Francisco, CA, Fire Safety Center]

EFFECT OF CARBON MONOXIDE AND NITROGEN DIOXIDE ON ICR MICE

J Combust Toxicol; 4(4):523-532, 1977

Times to incapacitation and death and LC₅₀ values were determined for male ICR mice exposed to different concentrations of carbon monoxide for 30 min and of nitrogen dioxide for 10 min in a 4.2 liter hemispherical chamber. The data indicate that ICR mice are more resistant to these two toxicants than Swiss albino mice. The carbon monoxide LC₅₀ for a 10-min exposure was above 2000 ppm for ICR mice compared to about 1000 ppm for Swiss albino mice. 1 fig, 4 tables, 13 refs. (Author)

1427. Lucia HL, Barrow CS, Stock MF and Alarie Y [Univ Pittsburgh, Grad School Public Health, Pittsburgh, PA, Dept Ind Environ Health Sci]

A SEMI-QUANTITATIVE METHOD FOR ASSESSING ANATOMIC DAMAGE SUSTAINED BY THE UPPER RESPIRATORY TRACT OF THE LABORATORY MOUSE, MUS MUSCULIS

J Combust Toxicol; 4(4):472-486, 1977

Standardized methodology was developed and used to evaluate the effects on the upper respiratory tract of mice following exposure to thermal decomposition products of various polymers. The results obtained justify the following rating for the polymers tested from most to least potent: polytetrafluoroethylene, polyvinylchloride > polyurethane, Douglas Fir > fiber glass reinforced polyester. Injury obtained with polyvinylchloride was very similar to that produced by hydrogen chloride. 7 figs, 2 tables, 7 refs. (Author)

1428. Robinson RS, Dressler DP [Harvard Med School, Cambridge, MA, Cambridge and Youville Hospitals], Dugger DL and Cukor P

SMOKE TOXICITY OF FIRE-RETARDANT TELEVISION CABINETS

J Combust Toxicol; 4(4):435-453, 1977

The Underwriters Laboratories requirement (UL 94-V-1) to add fire retardants to polymers used commercially for manufacturing television sets and other appliances has left unresolved possible unanticipated and undesirable effects: There is a likelihood that the fire retardant material, during combustion, could be more harmful than the polymer itself, including the formation of hazardous compounds of the volatile brominated species. Accordingly, the following three polymer materials used in the manufacture of television receivers were selected for study: 1) Polystyrene with antimony oxide and decabromodiphenyl oxide (PS-SB-BR); 2) polystyrene without flame retardant material (PS), and 3) polyphenylene oxide containing a tri-phenyl phosphate (PPOP). A bioassay technique and the apparatus employed in a number of similar and comparable studies was used. A total of 476 rats was exposed for 20 min at ambient temperatures in a controlled atmosphere to the pyrolysis products of the selected materials. Predesignated animals were also exposed in a chamber containing an apparatus to evaluate time of useful function (TUF) via maintenance of equilibrium and coordinated movement on running wheels. The data revealed that at a combustion chamber temperature of 450°C, deaths from

10. HUMAN BEHAVIOR, SOCIAL, AND MEDICAL PROBLEMS

b. Combustion Toxicology—Continued

the polystyrene alone were substantially more than for the other two materials containing fire retardants. At a combustion chamber temperature of 400°C, polystyrene was the only material which produced deaths. The evaluation of behavioral effects via TUF produced results which parallel the mortality data. Thermogravimetric/GC/MS analysis indicated no volatile bromine, antimony or phosphorous compounds at a detection limit estimated to be 100 ppb. 6 figs, 8 tables, 8 refs. (Author)

1429. Hilado CJ and Cumming HJ [*Univ San Francisco, CA, Fire Safety Center*]

A COMPILATION OF RELATIVE TOXICITY DATA
J Consumer Prod Flammability; 4(3):244-266, 1977

Relative toxicity test data on materials evaluated at the University of San Francisco are presented. Up to 270 materials have been evaluated using a specific set of test conditions. Data using ten different sets of test conditions are presented. 12 tables, 6 refs. (Author)

1430. Wands RC [*Nat Acad Sci, Nat Res Council, Washington, DC, Advisory Center on Toxicol*]

TOXICOLOGICAL HAZARDS OF COMBUSTION PRODUCTS
Navy Lifeline; (3):1-5, 1977

The toxicological hazards of combustion products from materials commonly encountered in today's fires are reviewed for Navy damage control crew members in a paper presented at the 19th Navy Occupational Health Workshop held in Charleston, SC. 4 photos.

1431. Luepke H, von and Schmidt K [*Zentrum der Rechtsmedizin Abteilung I, Frankfurt/Main, FRG*]

COMBINED CARBON DIOXIDE/HYDROGEN CYANIDE INTOXICATION DUE TO CHARRING OF PLASTICS
Z Rechtsmed; 79:69-71, 1977 (German; English Summary)

A case is reported of combined carbon monoxide and cyanide intoxication in which commodities and furniture containing plastics were identified as the source of cyanide. 10 refs. (Author)

1432. Thorne PF

THE TOXICITY OF HALON EXTINGUISHING AGENTS — A NEW APPRAISAL. *Fire Res Sta, Borehamwood, UK*; *Fire Res Note* 1073, 20 pages, 1 fig, 8 tables, 14 refs, Oct 1977

The toxicity of unpyrolyzed halons has been reassessed within the framework of a simple theory of anesthesia together with human response data. A new rating factor has been developed which is more directly relevant to actual exposures of man to halons. The factor is derived from a knowledge of the flame extinguishing properties of the halons together with their narcotic (anesthetic) properties. Proposals are made as to the use of the factor for selecting halons for particular fire protection applications. (Author)

1433. Dilley JV [*Stanford Res Inst, Menlo Park, CA*]

FLUOROCARBON POLYMER SMOKE TOXICITY
Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA
Sponsor: Stanford Res Inst, Fire Prot Eng Group

Experiments with exposure of animals to the pyrolysis products of three raw fluorocarbon polymers (copolymer of vinylidene fluoride and hexafluoropropene, and two different sources of copolymers of the above with additives to improve certain properties) to assess the toxicity and hazards of the pyrolysis products of these fluorocarbon polymers that might find application in aircraft or spacecraft materials and components are described. (A two-page critique of this paper with respect to utility of smoke toxicity research and the inability to predict a biological response without animal exposure tests by SB Martin of the Stanford Research Institute staff follows.) 11 pages, 2 figs, 5 tables.

c. EMERGENCY MEDICAL SERVICES AND FACILITIES

d. INJURIES AND FATALITIES

1434. Phillips AW [*Massachusetts General Hospital*]

EMERGENCY CARE FOR BURNS AND SMOKE INHALATION FOR LAYMEN
Soc Fire Prot Engrs and Nat Smoke, Fire and Burn Inst; 1st edit, 11 pages, 1977

This booklet on emergency care for burns and smoke inhalation for laymen deals in an orderly fashion in clear language with various aspects of the problem in five sections: Management of Smoke Inhalation Injury; Prevention of Infection; Surface Treatment of Large Burns; Surface Treatment of Small Burns; and Treatment of Special Problems (hand burns, painful burns, associated injuries, shock, nausea and vomiting). A handy summary provides concise information for treatment in one page.

1435. Wakabayashi K

PREVENTION OF FIRE INJURIES
Soda to Enso; 28(1):2-16, 1977 (Japanese)

The results of analytical investigations are given, which permit use of the methods of mathematical statistics for a quantitative and qualitative evaluation of the factors affecting the probability of suffering burns or poisoning by toxic gases during fires. 9 figs, 9 refs. (RZh)

e. PHYSIOLOGY

f. PSYCHOLOGY

1436. Strother Smith NC [*Fire Prot Assoc, London, UK*]
A STUDY OF THE BEHAVIOUR OF PEOPLE IN FIRES
Fire Prev; (121):16-24, 1977

Smoke, heat, noise and smell are the features of a fire which induce stress and may cause panic. The behavior patterns of people in fires are examined, with a wealth of case histories, to provide information for building designers and those concerned with educating and training people to behave safely. (This article was based on a paper presented at the 5th International Fire Protection Seminar, Karlsruhe, FRG, September 1976, which was reviewed in *FTA* 1(5), abstract 1904.) 8 photos, 11 refs.

FIRE TECHNOLOGY ABSTRACTS

10. HUMAN BEHAVIOR, SOCIAL, AND MEDICAL PROBLEMS

f. Psychology—Continued

1437. Lerup L
PEOPLE IN FIRES: A MANUAL FOR MAPPING. Univ California (Berkeley), Architectural Life Safety Group, Berkeley, CA; NBS GCR-77-106, 45 pages, 24 figs, 1977
Availability: NTIS

This manual provides step-by-step instructions for the investigation, data gathering and organization, and graphic mapping procedures involved in graphically presenting the behavior patterns of fire development of persons exposed to fire in a building. The manual is intended to be used in conjunction with NBS-GCR-76-73, "Mapping of Recurrent Behavior Patterns in Institutional Buildings under Fire: Ten Case Studies of Nursing Facilities," also prepared by Lars Lerup. The use of the mapping approach to fire reporting can provide better identification of an insight into both the development of fire and the reactions of persons to it. (Author)

11. CODES, STANDARDS, SAFE HANDLING, IDENTIFICATION OF HAZARDS

a. CODES

1438. Pointner R
STORAGE OF FLAMMABLE LIQUIDS
Betriebssicherheit; (2):6-7, 1977 (German)

The legal basis for the establishment of warehouses for flammable liquids in the FRG is provided primarily by the law of the Federal Ministry of Commerce and Transportation and of the Federal Ministry of Social Administration dated Feb 2, 1930 (BGBl No. 49/1930), which relates to the fundamental regulations concerning the storage of flammable liquids in commercial facilities, as formulated in the version of the law dated March 30, 1966 (BGBl No. 52). The concepts of this law are explained and the regulations are commented on. The most important rules governing the establishment and equipment of warehouses for flammable liquids are compiled in a table. 1 table.

1439. Konig A [*Vancouver Fire Dept, Vancouver, Canada*]
FIRE SAFETY STANDARDS IN VANCOUVER, CANADA
Fire; 70(Suppl):39-40, 1977

This paper was presented at the annual conference of the Institution of Fire Engineers (UK) held in Brighton on September 28-29, 1977. For a review of this paper consult the Source Index under *Fire Eng J*, 37(108):34-38, 1977.

1440. Paterson T [*Tayside Fire Brigade, UK*]
FIRE SAFETY DESIGN IN SCOTLAND
Fire Eng J; 37(108):39-43, 1977

The fire safety provisions of the Scottish Building Regulations as they refer to stairways, rescue and firefighting (rescue windows, access to buildings, firefighting facilities, dry rising fire mains, wet hydrant mains, and fire elevators) are reviewed. The "notes for guidance when inspecting plans" of the Tayside Fire Brigade, Building Regulations Parts D, E, and S, are included in an appendix. (For a review of the first part of this article, see the

Source Index of *FTA*, 2(1/2) under *Fire Eng J*, 37(107):17-23, 1977.)

1441. Treumann H [*Bundesanstalt fuer Materialprufung, FRG*]
OUTLINE OF THE CODE ON STORAGE OF EXPLOSIVE MATERIALS
VFDB Z; 26(3):86-90, 1977 (German; English and French Summaries)

The code on storage of explosive materials, as a federal regulation (FRG), replaces the previous codes on storage of explosives of the states. It has a much broader area of application than the previous codes. The development of the storage regulations is outlined, the provisions of the future regulations are described, and the particularly significant case of the future regulations from a safety engineering standpoint, the assignment of explosive materials to storage categories, and the results of categorization are explained. 2 figs, 1 table, 10 refs. (Author)

b. HAZARDS IDENTIFICATION

1442. Pasqualini F
THE TRANSPORTATION OF HAZARDOUS GOODS
Rev Tech Feu; 18(163):20-31, 1977 (French)

This article contains in part translations from the journals *Fire* and *Fire Engineering* from 1976, as well as contributions by Pasqualini and Riou, supported by statistical compilations. Considered are numbering, coding, aspects, difficulties, placarding of hazardous cargoes, statistical records of highway accidents with all the consequences, hazardous loading and transportation techniques, and an examination of the professional and human qualities of the truck drivers. Also discussed are the hazards of ammonia entering the drainage systems, protection against leakage of hazardous materials, containment and suppression of damages by hydrocarbons using foam generators, and other modern means. 7 figs, 3 tables. (Fachdok 13/0923)

c. SAFE HANDLING OF HAZARDOUS MATERIALS

1443. Schwartz LR, Jordan RD and Neumark HR [*Nat Hwy Trfc Saf Admin*]
HAZARDOUS MATERIALS — EMERGENCY ACTION GUIDE
Nat Hwy Trfc Saf Admin, US Dept Transp; Revised edit, 94 pages, 1977

This guide was prepared to help emergency service personnel during the first 30 min of an incident involving a spill of a volatile, toxic, gaseous and/or flammable material that is shipped in bulk. General and specific safety procedures to follow are provided in spill guides arranged alphabetically by hazardous material. Each left hand page identifies a specific hazardous material, outlines its potential hazards and provides immediate action information for fires, spills and first aid. This page also lists certain functions and services for those with appropriate resources and equipment. Each right hand page specifies recommended evacuation areas and distances for protecting the public from dangerous concentrations of toxic

11. CODES, STANDARDS, SAFE HANDLING, IDENTIFICATION OF HAZARDS

c. Safe Handling of Hazardous Materials—Continued

vapors and explosions. Where applicable, necessary water pollution controls are provided. This page also lists procedures to follow when assistance is needed or when appropriate resources and equipment are not available. To establish an evacuation area for a poisonous material, emergency service personnel need only estimate the size of the spill puddle. Illustrations on the right hand page offer quick reference for determining an evacuation based on spill puddle size. Exclusion distances covering ignition control and blast effects are given for certain flammable materials.

1444. Anon

CHEMSAFE AT WORK — HOW ICI PARTICIPATES IN THE SCHEME*Fire Prev*; (122):25-27, 1977

An account is given of how a leading chemical manufacturing firm (Imperial Chemical Industries Ltd, UK) participates in Chemsafe, the Chemical Industry Scheme for Assistance in Freight Emergencies, which was launched in the UK in 1974. The scheme is composed of three basic parts: first, participating companies ensure that vehicles are marked and labelled to a high standard; second, the companies arrange for specialist advice and, if necessary, assistance to be available round the clock for the emergency service; and third, as a back-up procedure in case the emergency services cannot contact the appropriate company or identify the chemical, advice is made available from the National Chemical Emergencies Center at Harwell. This article is concerned with the second aspect of Chemsafe. 2 photos, 1 ref.

1445. Solomon KA, Rubin M and Okrent D

ON RISKS FROM THE STORAGE OF HAZARDOUS CHEMICALS. Univ California, Los Angeles, School of Eng and Appl Sci, Energy and Kinetics Dept; UCLA ENG-76125, 61 pages, 4 figs, 10 tables, 7 refs, Dec 1976

One part of a broad range of studies carried out under a study program entitled "A General Evaluation Approach to Risk-Benefit for Large Technological Systems, and its Application to Nuclear Power" deals with obtaining improved knowledge and perspective concerning existing hazards and risks in society. One such area relates to the potential hazards and risks arising from the storage of large quantities of hazardous chemicals close to towns or larger population centers. In principle, the direct way to approach this question is to obtain specific information on locations where large quantities of hazardous chemicals are stored and on the safety standards employed in building and maintaining the storage facilities. Given such information, fault-tree and other methodologies could be employed to estimate the probability of release from man-made and natural causes, and the consequences of such releases on the public health and safety could be evaluated, considering meteorological factors and the population distribution, as well as the potential for evacuation in case of accident. On the basis of a survey directed at all fifty states for information concerning the means used by the state in evaluating and regulating risks from storage of potentially hazardous chemicals and a brief survey of the measures employed in the cities of Los Angeles and El Segundo, CA, in regulating the construction and use of facilities to store hazardous chemicals, parametric hazard calculations are performed for postu-

lated accidents having assumed population distributions to provide a rough assessment of the potential hazard.

d. STANDARDS

1446. Gandara UJ, de la

STANDARDS AND REGULATIONS IN FIRE PROTECTION*ASELF*; (59):89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 1976 (Spanish)

The existing Spanish standards relating to various aspects of fire protection are divided into two groups, those in the nature of recommendations and those which are obligatory. The Technical Commission of the National Institute of Standardization and Regulation has developed standards regulating the equipment and materials to be used in firefighting, as well as standards data on the fire resistance of building construction. In recent years the work of the Commission has been devoted to a revision of the existing standards to coincide with the standards and recommendations of the International and European Standardization Organizations (ISO and CEN). Also being developed by an Inter-Departmental Governmental Commission are standards that will be more universal than the previous standards. The project includes five chapters: general requirements; instructions relating to building materials and structures; instructions on fire safety in construction; fire safety in agriculture, industry and trades; garages, hangars and workshops. Technological standards on construction (NTE-IPE/1974), which have been approved by the Spanish Construction Ministry and which apply to nonindustrial buildings of up to 20 stories, cover all aspects of fire safety in these buildings, including instructions on space, layout, fire resistance of building structures, types of fire detection and extinguishing systems to be used, etc. The existing regulations for pressurized vessels, although not directly related to fire protection, contain instructions which apply to large-capacity fire extinguishers and containers used for fixed installations. There are also standards governing regulations for safe performance of work in the oil-refining industry and in oil storage areas. In recent months a standards outline has been developed for the safe storage of hazardous chemicals and products. Electrical safety in industry using low voltage is provided for in standards which have been in effect since 1974. Instructions have been issued in which the operational responsibilities, organizational structure and other aspects of the fire service and other rescue services are listed. Also provided for are standards literature of a more specific nature. (RZh)

1447. Anon

FIRE PROTECTION PROPERTIES AND TERMINOLOGY*Fire*; 70(869):296, 299-300, 1977

Many of the terms used to describe the fire properties of materials and products are at best not readily understandable, and at worst misleading. To discuss the new approaches to these problems which the British Standards Institution OC/IO Committee is considering, the Fire Protection Association and the Institution of Fire Engineers arranged a meeting of the Fire Technology Forum on Fire Protective Properties and Terminology. The opinions of the various participants are recounted, including a

11. CODES, STANDARDS, SAFE HANDLING, IDENTIFICATION OF HAZARDS

d. Standards—Continued

member of the OC/IO committee, a representative of the Department of Prices and Consumer Protection explaining the views of government, a practicing architect, and a representative of the Fire Research Station.

1448. Konig A [*Vancouver Fire Dept, Vancouver, Canada*]
VANCOUVER'S FIRE SAFETY STANDARDS
Fire Eng J; 37(108):34-38, 1977

The measures taken by the city of Vancouver to ensure fire safety without increasing the fire department, especially for older apartments and hotels and for the increasing number of highrise buildings, reduce to the enactment of retroactive fire by-laws requiring upgrading and the recommendation that highrise buildings be equipped with sprinkler systems. Other fire protection measures are examined, such as "fireproofing" and the efficacy of smoke removal for highrise buildings.

1449. Severud CN and Thorpe RF [*Falcon Safety Products, Inc*]
AN ANALYSIS OF EXISTING RESTRICTIONS ON THE INSTALLATION OF SINGLE-STATION SMOKE AND HEAT DETECTORS
Fire J; 71(5):41-44, 101, 1977

In order to clarify the question of minimum and complete fire protection for household fire warning equipment, matrixes of the four levels of fire protection as specified in NFPA Standard 74, *Standard for Household Fire Warning Equipment*, with requirements and restrictions, as well as recommendations for improvement of the standard, for manufacturers to establish standards for all consumer information relating to the installation of single-station detectors, and for determination of near and remote sound levels to awaken an "average" person are given. 5 figs, 14 refs.

1450. Anon
PART 1633 — PROPOSED STANDARD FOR THE FLAMMABILITY OF GENERAL WEARING APPAREL (PFF-)
J Consumer Prod Flammability; 4(3):288-326, 1977

This draft proposed flammability standard was developed by the National Bureau of Standards and recommended to the Consumer Product Safety Commission. This is a CPSC staff draft which has no endorsement by the CPSC Commissioners. The proposed standard is published here as a service to our readers. (Author)

1451. Anon
PART 1633 — PROPOSED STANDARD FOR THE FLAMMABILITY (CIGARETTE IGNITION RESISTANCE) OF UPHOLSTERED FURNITURE (PFF 6-76)
J Consumer Prod Flammability; 4(3):267-287, 1977

This draft proposed flammability standard was developed by the National Bureau of Standards and recommended to the Consumer Product Safety Commission. This is a CPSC staff draft that has no endorsement by the CPSC Commissioners. The proposed standard is published here as a service to our readers. (Author)

12. INSURANCE, ECONOMICS OF LOSS AND PREVENTION

a. INSURANCE

1452. Bigglestone H [*Insurance Services Office (ISO), San Francisco, CA*]
THE ROLE OF ISO; Paper No. 4.1
Fire Safety Conf, Internat, Second, Proc; 1977, Jan 24-28, San Francisco, CA, pages 367-370
Sponsor: Univ San Francisco, Fire Safety Center

The range of insurance services provided by the Insurance Services Offices is reviewed, especially surveying and classifying the fire defenses of cities and communities countrywide, the findings of which are used as one of the factors in the establishment of fire insurance rates. Municipal fire protection criteria have been incorporated with a Grading Schedule to evaluate fire defense and physical conditions. The procedures of evaluation and classification according to the grading schedule are elaborated.

b. LOSSES

c. RESTORATION

d. RISK MANAGEMENT

1453. NFPCA
URBAN GUIDE FOR FIRE PREVENTION AND CONTROL MASTER PLANNING
Nat Fire Prev and Control Admin, Washington, DC; 1st edit, 312 pages, 1977

This Planning Guide has been developed by the National Fire Prevention and Control Administration as an aid in performing fire protection master planning at the community level. It can be used in any community which has responsibility for master planning and control; however, other planning documents based on this planning guide will be directed toward the problems of fire protection in smaller towns and rural areas, and toward the role of the state in fire protection. Master planning for fire protection is aimed at the definition, development, and maintenance of the best fire prevention and control system for communities. It takes into account all elements that affect fire protection. This Guide contains comprehensive, straightforward, adaptable, nontechnical procedures that may be used to develop and implement a fire protection system through a long-range master plan. The Guide is composed as follows: Introduction; Executive Summary; Overview of the Planning Process; How to Use this Planning Guide; Instructions for Organizing the Planning; Instructions for Preparing the Plan; Instructions for Implementing the Plan; Glossary; and Appendixes (information and procedures supplementing the instructions). Also included are reproducible forms (Analysis Results Format, System Comparison Format, Legislative Analysis Format, and the like) in the Forms Section.

1454. Harvey B [*Health and Safety Commission, UK, Advisory Comm on Major Hazards*]
MAJOR HAZARDS
Fire; 70(Suppl):17-18, 1977

FIRE TECHNOLOGY ABSTRACTS

12. INSURANCE, ECONOMICS OF LOSS AND PREVENTION

d. Risk Management—Continued

Extracts from a paper presented by the author at the Chief and Assistant Chief Fire Officers' Association Conference (UK) held at Brighton in September, 1977, are given. Actions taken in the UK to confront the problem of major hazards posed by the post-war science-based technology, characterized by new materials, new processes, automation, and above all, by the exploitation of highly toxic or highly flammable materials on a vast scale, in the period prior to Flixborough are reviewed and examined, in particular, the concern of the Factory Inspectorate, as embodied in the Robens Report in 1972, in which some sort of licensing was suggested, to be enforced by a special unit within the Inspectorate to enforce health and safety at work, particularly the large-scale risks involving flammable and toxic substances and, more generally, with all industrial situations with a potential for causing danger to the public on a large scale.

1455. Walsh CV [New York City Fire Dept, NY]

MBO IN FIRE PREVENTION

Fire Command; 44(12):28-29, 1977

The management-by-objective technique can be effectively applied in fire prevention. The key to successful operations is to first select the proper minor objectives and then to perform the functions that will effectively attain them. The specific objectives of fire prevention are identified and suggestions for attaining them are enumerated and elaborated: 1) reduce public indifference to fire and its effects; 2) give equal time to fire prevention and fire suppression; 3) destroy deteriorated or abandoned buildings; 4) reduce arson fires; 5) reduce hazards caused by defective construction and inadequate labeling; and 6) improve inspection programs. 1 ref.

1456. Anon

FIRE SAFETY OPTIMIZATION

Oesterr Feuerwehr; 31(4):66, 69-70, 1977 (German)

Optimum fire safety, that is, the correct proportion between cost and protective effects, can be reached by methodical risk evaluation. A description is given of how the existing status is first assessed by a step-by-step procedure, the goals are set, and then the ways and means are chosen. Setting a goal implies that all the negative effects of a fire have been subjected to a rigorously exact evaluation, yielding the type of means to be employed, both quantitatively and qualitatively. At the same time a residual risk, which must be accepted, is determined. The resultant system of optimum fire safety must be realized without cutting corners if the measures decided on are not to lose their protective value. 3 figs, 2 tables. (Fachdok 13/0841)

1457. Berg KE

DYNAMIC INTERRELATIONSHIPS: FIRE PROTECTION AND INSURANCE

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA

Sponsor: Stanford Res Inst, Fire Prot Eng Group

The relationship between the level of investment in industrial or municipal fire protection, the effects on the Insurance Services Office grading, and the impact on cost management are discussed. Levels of protection (grades), municipal fire defenses and insurance rates, and the rela-

tionship between protection level, costs, and expected losses are given in charts and tables. The relationship is found to be direct, but not always linear. Control of loss severity by means of fire protection is the governing factor despite the change in details of this relationship because of the increasing use of alternative tools for handling risk. 8 pages, 2 tables.

1458. Witzeman L [Rural/Metro Fire Prot Co, Scottsdale, AZ]

APPLICATIONS: INNOVATING COST-EFFECTIVE FIREFIGHTING

Fire Protection Technology Seminar, Annual, Second, Proc; 1976, Oct 14, Menlo Park, CA

Sponsor: Stanford Res Inst, Fire Prot Eng Group

In a slide presentation the president of a private fire service with some 27 locations in Arizona operating a fleet in excess of 100 fire trucks and auxiliary vehicles describes the services provided by this company, particularly the seven-year master plan for the City of Scottsdale, Arizona, Fire Department, which was predicated on the enactment of a sprinkler ordinance, policies with regard to auxiliary firefighters and costing analysis, and the equipment available or devised to fulfill the requirements of the plan. The degree with which the plan predictions were met by actual developments is also discussed, along with the projected plans. 34 pages.

e. SALVAGE

13. STATISTICS

1459. NFPA Fire Analysis Dept

1976 LARGE-LOSS FIRES IN THE UNITED STATES

Fire J; 71(5):51-55, 60, 1977

The statistics of large-loss fires (\$250,000 or more damages to buildings and contents) in the US in 1976 compiled by the NFPA Fire Analysis Department are compiled in 6 tables and commented on in the introduction, revealing a sharp increase in the number over 1975 (719 compared to 551) and in the property destroyed by these losses (\$631,710,488 compared to \$579,449,117). The study is based on voluntary information supplied by state and local fire marshals, fire departments, and insurance interests without claim to completeness, but in large enough numbers to indicate the magnitude and character of the large-loss fire problem. 6 tables, 1 ref.

1460. NFPA Fire Analysis Dept

1976 MULTIPLE-DEATH FIRES IN THE UNITED STATES

Fire J; 71(5):61-64, 1977

The statistics of multiple-death fires (three or more fatalities) in the US in 1976 are compiled in 3 tables and are commented on in the introduction, revealing a substantial upward trend in both the number of reported multiple-death fires and the number of associated deaths (31 and 38% increase, respectively, for the period 1974-1976). In the same period there have been significant improvements in fire reporting, possibly contributing to the observed increases. The summary was compiled from information supplied by state and local fire officials, and

13. STATISTICS

by the membership and staff of NFPA. The study does not pretend to completeness, but is believed to include the great majority of such fires. 2 photos, 2 figs, 3 tables, 4 refs.

1461. Anon

FPA CASEBOOK OF SOME RECENT MAJOR FIRES

Fire Prev; (121):32-46, 1977

The Fire Protection Association (FPA) casebook contains a statistical compilation of major fire damage in the UK for May-June, 1977, and a brief description of some notable non-UK fires for the same period. Thirteen major UK fires are discussed in terms of main features, including estimated damage, description of premises, cause of the fire, firefighting tactics, and a narrative of the fire. Six other notable industrial fires are described in brief. Photographs and diagrams accompany the descriptions of the incidents. 7 figs, 13 photos.

1462. Anon

FPA CASEBOOK OF SOME RECENT MAJOR FIRES

Fire Prev; (122):31-44, 1977

The Fire Protection Association (FPA) casebook contains a statistical compilation of major fire damage in the UK for July-August, 1977, and a brief description of some notable non-UK fires for the same period. Seven major fires (one non-UK) are discussed in terms of main features, including estimated damage, description of premises, cause of the fire, firefighting tactics, and a narrative of the fire. Eight other notable fires and eight marine fires are described in brief. Photographs and diagrams accompany the descriptions of the incidents. 11 figs, 11 photos.

1463. Kurogi T

STATISTICS OF ACCIDENTS STEMMING FROM THE USE OF ELECTRICAL EQUIPMENT

Seisan to Denki; 29(2):7-14, 1977 (Japanese)

In 1975 there were recorded in Japan 12,413 cases which led to fires and injuries as a direct or indirect result of using electricity, 11,571 of these cases involving industrial and 842 involving domestic electrical equipment. Various statistical indicators are given, including specific indicators characterizing the hazard level of electrical equipment, as well as the effectiveness of using various protective means. Thus, in 1969-1975 the number of fires per million kW of electrical power dropped from 3.6 to 1.7, the number of fires per 100 km of high-voltage transmission lines dropped from 3 to 1.75, and the total number of fatalities and injuries dropped from 513 persons in 1968 to 319 in 1975. 6 figs, 6 tables. (RZh)



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112 Magazin fuer den Feuerwehrmann 112 Magazin fuer den Feuerwehrmann [112, The Firefighters Magazine]	[Atomic Industry, Atomic Engineering]
AIChE Monogr Ser American Institute of Chemical Engineers Monograph Series	Aust Plast Rubber..... Australian Plastics and Rubber
Aircraft Eng..... Aircraft Engineering	Automot Eng (London)..... Automotive Engineer (London)
Airport Forum..... Airport Forum	Aviat, Space, Environ Med..... Aviation, Space and Environmental Medicine
Allo 18..... Allo 18 [Calling 18]	BASF..... Badische Anilin- und Soda-Fabrik AG Review [Review of the Baden Aniline and Soda Manufacturing Company]
Aluminium (Duesseldorf)..... Aluminium [Aluminum]	Baugewerbe..... Baugewerbe [Building Trade]
Am Chem Soc. Div Org Coat Plast Chem. Prepr..... American Chemical Society. Division of Organic Coatings and Plastics Chemistry. Preprints	Bautechnik..... Bautechnik [Construction Engineering]
Am Dyestuff Reporter..... American Dyestuff Reporter	Bauwelt..... Bauwelt [Building World]
Am Fuel Soc Trans.... American Fuel Society. Transactions	Berufsgenoss..... Berufsgenossenschaft [Employers' Liability Insurance]
Am Health Care Assoc J..... American Health Care Association. Journal	Betonwerk - Fertigteil-Tech..... Betonwerk + Fertigteil-Technik [Concrete Work + Finished Parts Technology]
Am J Clin Pathol..... American Journal of Clinical Pathology	Betriebssicherheit..... Betriebssicherheit: Zeitschrift fuer Unfallverhuetung und Erste Hilfe [Plant Safety: Journal of Accident Prevention and First Aid]
Am J Publ Health..... American Journal of Public Health	Bezop Tr Prom-sti... Bezopasnost Truda v Promyshlennosti [Occupational Safety in Industry]
Am Lab..... American Laboratory	Bezpieczen Pr..... Bezpieczenstwo Pracy [Occupational Safety]
Am Nucl Soc Trans..... American Nuclear Society. Transactions	Binnenschiffahrts-Nachr..... Binnenschiffahrts-Nachrichten [Inland Shipping Communications]
Amts Mittellungsbl Bundesanst Materialpruef..... Amts- und Mitteilungsblatt der Bundesanstalt fuer Materialpruefung [Official Gazette and Communications of the Federal Bureau for Materials Testing]	Boira Gishi..... Boira Gishi [Boilermen]
Ann Pharm Fr..... Annales Pharmaceutiques Francaises [French Pharmaceutical Annals]	Brand Aus..... Brand Aus [All Out]
Ann Surg..... Annals of Surgery	Brand Brandweer..... Brand en Brandweer [Fire and Fire Service]
Antincend Protez Clv..... Antincendio e Protezione Civile [Fire and Public Protection]	Brandforsvar..... Brandforsvar [Fire Protection]
Arch Environ Health..... Archives of Environmental Health	Brandhilfe..... Brandhilfe [Fire Assistance]
Arch Thermodyn Spal..... Archiwum Termodynamiki i Spalania [Archives of Thermodynamics and Combustion]	Brandschutz..... Brandschutz. Deutsche Feuerwehr-Zeitung [Fire Protection. German Fire Service Gazette]
Arumlnyumu..... Aruminyumu [Aluminum]	Brandvaern..... Brandvaern [Fire Protection]
ASELF..... Asociacion Espanola de Lucha Contra el Fuego [Spanish Fire Fighting Association]	Brandverhuetung..... Brandverhuetung [Fire Prevention]
ASHRAE J..... American Society of Heating, Refrigerating and Air-Conditioning Engineers Journal	Brandwacht..... Brandwacht [Firewatch]
ASME Trans. Ser C. J Heat Transfer..... American Society of Mechanical Engineers. Transactions. Series C. Journal of Heat Transfer	Brass Malt Europe..... Brasserie et Malterie en Europe [Brewing and Malting in Europe]
ASTM Standardization News..... American Society for Testing and Materials. Standardization News	Br Plast Rubber..... British Plastics and Rubber
Atomwlrtsch Atomtech..... Atomwirtschaft, Atomtechnik	Budow Okretowe..... Budownictwo Okretowe [Naval Architecture]
	Build Eng..... Building Engineering
	Build Stand..... Building Standards
	Build Syst Des..... Building Systems Design
	Cah Cent Sci Tech Batim..... Cahiers du Centre

EXPANSIONS OF JOURNAL ABBREVIATIONS

<i>Scientifique et Technique du Batiment</i> [Communications of the Scientific and Technical Building Center]	<i>Dun's Rev</i> <i>Dun's Review</i>
Can J Civ Eng..... <i>Canadian Journal of Civil Engineering</i>	Electr Constr Maint..... <i>Electrical Construction and Maintenance</i>
Can Soc Forensic Sci J..... <i>Canadian Society of Forensic Science Journal</i>	Electron Power..... <i>Electronics and Power</i>
Can Text J..... <i>Canadian Textile Journal</i>	Electr Rev (London)..... <i>Electrical Review (London)</i>
Cem Concr Res..... <i>Cement and Concrete Research</i>	Elek-Prakt..... <i>Elektro-Praktiker</i> [Electrical Practitioner]
Cerberus Alarm..... <i>Cerberus Alarm</i>	Elektrizitaetswirtschaft..... <i>Elektrizitaetswirtschaft</i> [Electrical Economy]
Chantiers..... <i>Chantiers</i> [Ship Yards]	Elektrotech Z. B..... <i>Elektrotechnische Zeitschrift. B</i> [Electrotechnical Journal. B]
Chem Age India..... <i>Chemical Age of India</i>	Elektroteknika..... <i>Elektroteknika</i> [Electrical Engineering]
Chem Eng..... <i>Chemical Engineering</i>	Energetik..... <i>Energetik</i> [Power Engineer]
Chem Eng/Deskbook Issue..... <i>Chemical Engineering/Deskbook Issue</i>	Energetyka (Poland)..... <i>Energetyka (Poland)</i> [Power Engineering (Poland)]
Chem Eng (London)..... <i>The Chemical Engineer (London)</i>	Enerugi..... <i>Enerugi</i> [Energy]
Chem Eng Prog..... <i>Chemical Engineering Progress</i>	Engineering (London)..... <i>Engineering (London)</i>
Chemiefasern/Text Ind..... <i>Chemiefasern/Textilindustrie</i> [Chemical Fibers/Textile Industry]	Eng Mat Des..... <i>Engineering Materials and Design</i>
Chem Kunstst Aktuell..... <i>Chemie Kunststoffe Aktuell</i> [Chemistry and Plastics Today]	Environ Health Perspect..... <i>Environmental Health Perspectives</i>
Chem Rundsch.. <i>Chemische Rundschau</i> [Chemical Review]	Face au Risque..... <i>Face au Risque</i> [Facing the Risk. Journal of the French National Prevention and Protection Center]
Chem Tech (Heidelberg)..... <i>Chemie-Technik (Heidelberg)</i> [Chemistry Technology (Heidelberg)]	Fahrzeug Kaross..... <i>Fahrzeug und Karosserie</i> [Vehicle and Car Bodies]
Chem Tech (Leipzig)..... <i>Chemische-Technik (Leipzig)</i> [Chemistry Technology (Leipzig)]	Faserforsch Textiltech.... <i>Faserforschung und Textiltechnik. Zeitschrift fuer Polymerforschung</i> [Fiber Research and Textile Engineering. Journal of Polymer Research]
Chest..... <i>Chest</i>	Feuerwehr..... <i>Die Feuerwehr</i> [The Fire Service]
Chimia..... <i>Chimia</i> [Swiss Chemists Association]	Fire..... <i>Fire</i>
Clin Chim Acta..... <i>Clinica Chimica Acta</i> [Clinical Chemistry Transactions]	Fire Chief..... <i>Fire Chief</i>
Coal Age..... <i>Coal Age</i>	Fire Command..... <i>Fire Command</i>
Combust Flame..... <i>Combustion and Flame</i>	Fire Eng..... <i>Fire Engineering</i>
Combust Sci Technol. <i>Combustion Science and Technology</i>	Fire Eng J..... <i>Fire Engineers Journal</i>
Computer Des..... <i>Computer Design</i>	Fire Fighting Canada..... <i>Fire Fighting in Canada</i>
Constr Specifier..... <i>Construction Specifier</i>	Fire Internat..... <i>Fire International</i>
Consult Eng..... <i>Consulting Engineer</i>	Fire J..... <i>Fire Journal</i>
Data Manage..... <i>Data Management</i>	Fire Mater..... <i>Fire and Materials</i>
Decis Sci..... <i>Decision Sciences</i>	Fire Prev..... <i>Fire Prevention</i>
Denkl Hyoron..... <i>Denki Hyoron</i> [Electrical Review]	Fire Prev Sci Technol..... <i>Fire Prevention Science and Technology</i>
Denki Joho..... <i>Denki Joho</i> [Electrical Information]	Fire Prot Rev..... <i>Fire Protection Review</i>
Denki Keisan..... <i>Denki Keisan</i> [Electrical Calculation]	Fire Res Inst Japan. Rep..... <i>Fire Research Institute of Japan. Report</i> [Shobo Kenkyusho Hokoku]
Denryoku to Tetsudo..... <i>Denryoku to Tetsudo</i> [Electric Lighting and Facilities in Railways]	Fire Sci Lab Japan. Rep..... <i>Fire Science Laboratory of Japan. Report</i> [Shobo Kagaku Kenkyushoho]
Densetsu Kogyo..... <i>Densetsu Kogyo</i> [Electrical Construction Engineering]	Fire Service Inf..... <i>Fire Service Information</i>
Diesel Gas Turb Prog..... <i>Diesel and Gas Turbine Progress</i>	Fire Surv..... <i>Fire Surveyor</i>
Dis Nerv Syst..... <i>Diseases of the Nervous System</i>	Fire Technol..... <i>Fire Technology</i>
Dlteru..... <i>Dlteru</i> [Detail: Magazine for Architects and Engineers]	Fiz Gorennya Vzryva..... <i>Fizika Gorennya i Vzryva</i> [Combustion and Explosion Physics]
Donetsk N-I Ugol-n In-t. Tr..... <i>Donetsk Nauchno-Issledovatel'skiy Ugol'nyy Institut. Trudy</i> [The Donetsk Coal Research Institute. Transactions]	Flight Internat..... <i>Flight International</i>
Draegerheft..... <i>Draegerheft</i> [Draeger Bulletin]	Flight Oper..... <i>Flight Operations</i>
Drahtwelt..... <i>Drahtwelt</i> [Wire World]	Formage Trait Met..... <i>Formage et Traitement des</i>

EXPANSIONS OF JOURNAL ABBREVIATIONS

<i>Metaux</i> [Metal Shaping and Finishing]	<i>Zivilverteidigung</i> [International Civil Defense]
FoU-Brand <i>Forskning och Utveckling-Brand</i> [Fire Research and Development News]	Int Water Power Dam Constr <i>International Water Power and Dam Construction</i>
Gas Erdgas <i>Gas- und Wasserfach, Gas-Erdgas</i> [Gas and Water Technology, Gas - Natural Gas]	ISA Trans <i>Instrument Society of America. Transactions</i>
Gaz Arch <i>Gazette des Archives</i> [Archives Gazette]	J Aircr <i>Journal of Aircraft</i>
Glueckauf <i>Glueckauf</i> [Journal of Mining Engineering and Industry]	J Am Hosp Assoc <i>Journal of the American Hospital Association</i>
Glueckauf Forschungsh <i>Glueckauf-Forschungshefte</i> [Glueckauf Research Journal]	J Am Med Assoc <i>Journal of the American Medical Association</i>
Haikan Gijutsu <i>Haikan Gijutsu</i> [Piping Engineering]	J Am Podiatry Assoc <i>Journal of the American Podiatry Association</i>
Haikan to Sochi <i>Haikan to Sochi</i> [Piping and Process Mechanics]	Jap Assoc Fire Sci Eng. Bull <i>Japanese Association of Fire Science and Engineering. Bulletin</i> [Nihon Kasai Gakkai Ronbunshu]
Hansa <i>Hansa; Zeitschrift fuer Schifffahrt, Schiffbau, Hafen</i> [Hansa; Journal of Shipping, Shipbuilding, Ports]	J Appl Polym Sci <i>Journal of Applied Polymer Science</i>
Heat Piping Air Condit. <i>Heat, Piping and Air Conditioning</i>	J Br Fire Serv Assoc and Ind Fire Prot Assoc <i>Journal of the British Fire Service Association and of the Industrial Fire Protection Association</i>
Hess Feuerwehr Z <i>Hessische Feuerwehr-Zeitschrift</i> [Hessian Fire Service Journal]	J Cell Plast <i>Journal of Cellular Plastics</i>
Hitachi Hyoron <i>Hitachi Hyoron</i> [Hitachi Review]	J Coated Fabrics <i>Journal of Coated Fabrics</i>
Holz Kunststoffverarb <i>Holz- und Kunststoffverarbeitung</i> [Wood and Plastics Processing]	J Coatings Technol <i>Journal of Coatings Technology</i>
Hosp Topics <i>Hospital Topics</i>	J Combust Toxicol <i>Journal of Combustion Toxicology</i>
Household Pers Prod Ind <i>Household and Personal Products Industry</i>	J Consumer Prod Flammability <i>Journal of Consumer Product Flammability</i>
Hydrocarb Process <i>Hydrocarbon Processing</i>	J Fire Flammability <i>Journal of Fire and Flammability</i>
ICAO Bull <i>International Civil Aviation Organization Bulletin</i>	J Fire Retard Chem ... <i>Journal of Fire Retardant Chemistry</i>
IEEE Trans. Nucl Sci <i>Institute of Electrical and Electronics Engineers Transactions. Nuclear Science</i>	J Forensic Sci <i>Journal of Forensic Sciences</i>
Ind Elektr - Elektron <i>Industrie Elektrik + Elektronik</i> [Electrical and Electronics Industry]	J Occup Med <i>Journal of Occupational Medicine</i>
Ind Ital Cem <i>Industria Italiana del Cemento</i> [Italian Cement Industry]	J Prod Liability <i>Journal of Products Liability</i>
Ind J Experim Biol <i>Indian Journal of Experimental Biology</i>	J Res NBS <i>US National Bureau of Standards. Journal of Research</i>
Ind Lackier Betr <i>Industrie Lackier-betrieb</i> [Varnish Industry and Operations]	J Sound Vib <i>Journal of Sound and Vibration</i>
Ind Miner Mine <i>Industrie Minerale, Mine</i> [Mineral Industry, Mines]	J Urban Anal <i>Journal of Urban Analysis</i>
Ind Tech <i>Industrie et Technique</i> [Industry and Engineering]	Kagaku Gijutsu-MOL <i>Kagaku Gijutsu-MOL</i> [Chemical Engineering-MOL]
Inf Chlmle <i>Informations Chimie</i> [Chemical Information]	Kagaku Kojo <i>Kagaku Kojo</i> [Chemical Factory]
Inf Constr <i>Informes de la Construcccion</i> [Construction News]	Kasal <i>Kasai</i> (Nihon Kasai Gakkai-shi) [Journal of the Fire Prevention Society of Japan]
Ingenloren <i>Ingenioren</i> [Engineering]	Kautsch Gummi Kunstst <i>Kautschuk und Gummi. Kunststoffe</i> [Crude and Vulcanized Rubber. Synthetics]
Ing Entretlen <i>Ingenieur d'Entretien</i> [Maintenance Engineer]	Kayakurui, Koatsu Gasu Torishimari Geppo <i>Kayakurui, Koatsu Gasu Torishimari Geppo</i> [Monthly Report of Explosives and High Pressure Gas]
Ing Nav <i>Ingenieria Naval</i> [Naval Engineering]	Kelso <i>Keiso</i> [Instrumentation]
Instalador <i>Instalador</i> [Installer]	Knitting Times <i>Knitting Times</i>
Insulation (London) <i>Insulation (London)</i>	Koatsu Gasu <i>Koatsu Gasu</i> [Journal of the Institute of Safety in High Pressure Gas Engineering (Japan)]
Internat Zivilverteidigung <i>Internationale</i>	Kogai to Talsaku <i>Kogai to Taisaku</i> [Journal of Environmental Pollution Control]
	Koroze Ochr Mater <i>Koroze a Ochraha Materialu</i> [Corrosion and Protection of Materials]
	Kozhevenno-Obuvn Prom-st. <i>Kozhevenno-Obuvnaya Promyshlennost</i> [Leather Shoe Industry]
	Krafthand .. <i>Krafthand</i> [Krafthand; Journal of Technology]

EXPANSIONS OF JOURNAL ABBREVIATIONS

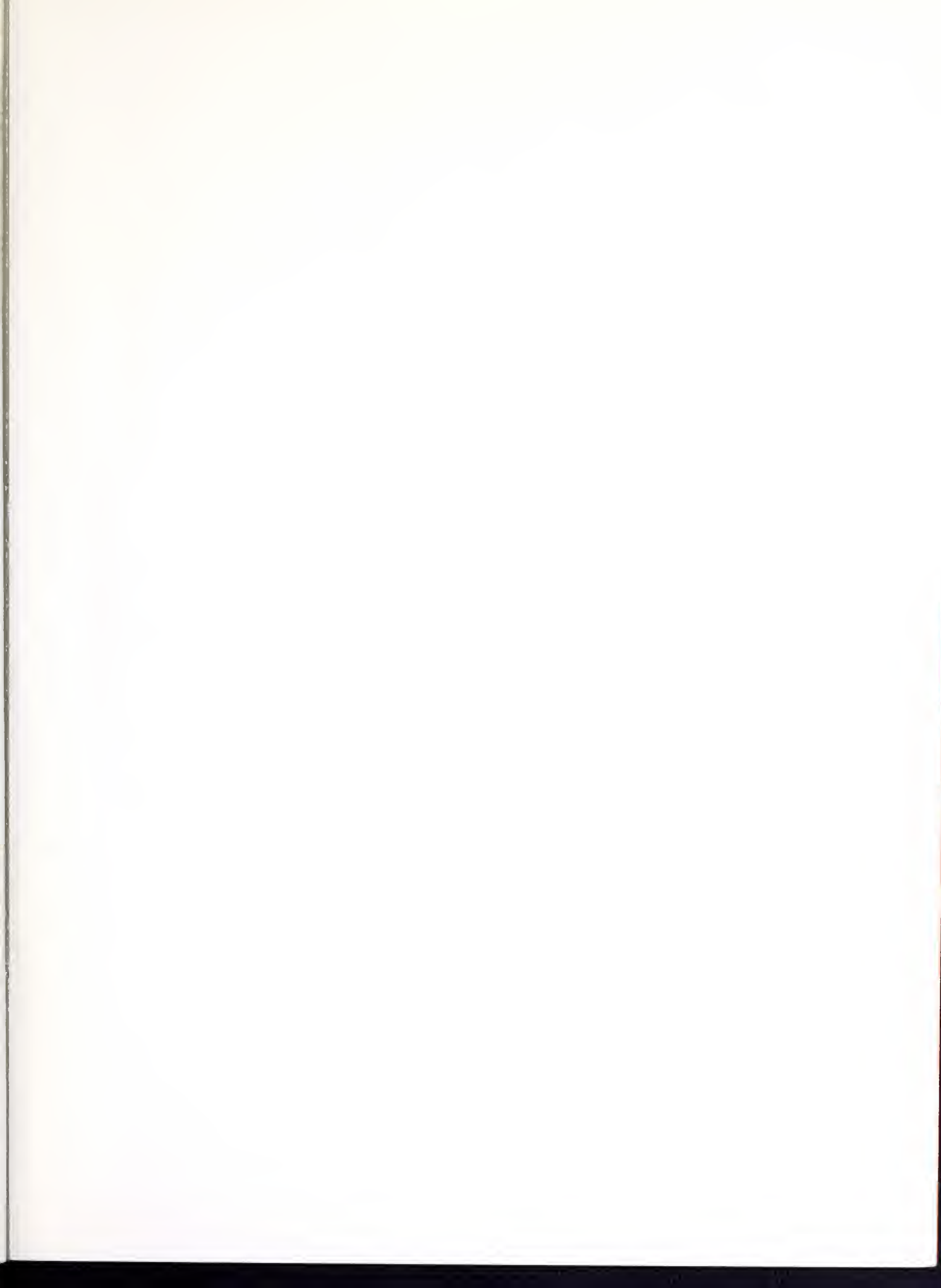
Kriminalistik	<i>Kriminalistik</i> [Criminology]	Mod Plast	<i>Modern Plastics</i>
Kuki Tyowa to Reito	<i>Kuki Tyowa to Reito</i> [Air Conditioning and Refrigeration]	Nachrichten-Elektron	<i>Nachrichten-Elektronik</i> [Communications Electronics]
Kunstst	<i>Kunststoffe</i> [Plastics]	Nafta (Poland)	<i>Nafta (Poland)</i> [Petroleum (Poland)]
Kunstst Plast	<i>Kunststoffe-Plastics</i>	Nat Saf News	<i>National Safety News</i>
Kyoseki Jiho	<i>Kyoseki Jiho</i> [Kyodo Sekiyu Oil News]	Nature (UK)	<i>Nature (UK)</i>
Kyoto Kogai Sen'i Daigaku Sen'i Gakubu Gakujutusu Hokoku	<i>Kyoto Kogai Sen'i Daigaku Sen'i Gakubu Gakujutusu Hokoku</i> [Bulletin of the Faculty of Textile Science, Kyoto University of Industrial Arts and Textile Fibers]	Nauch Tr Akad Kommun Kh-va	<i>Nauchnye Trudy Akademii Kommunal'nogo Khozyaistva</i> [Academy of Communal Services. Scientific Papers]
Lab Data	<i>Laboratory Data</i>	Naut Tech Tijdschr Zee	<i>Nautisch Technisch Tijdschrift Zee</i> [Ocean-Maritime Engineering Journal]
Ladenburger Kreis	<i>Ladenburger Kreis</i> [Ladenburg Ring; Company Journal of Total-Foerstner u. Co]	Navy Lifeline	<i>Navy Lifeline</i>
Lager	<i>Lager</i> [Warehouse]	NEC Res and Dev	<i>NEC Research and Development</i> [Nippon Electric Company Research and Development]
Lakokras Mater Ikh Primen	<i>Lakokrasochnye Materialy i Ikh Primenenie</i> [Paints and Varnishes and Their Applications]	Neue Bergbautech	<i>Neue Bergbautechnik</i> [New Mining Technology]
Landtech Inf	<i>Landtechnische Information</i> [Agricultural Engineering Information]	Nihon Josen Gakkaishi	<i>Nihon Josen Gakkaishi</i> [Bulletin of the Society of Naval Architects of Japan]
Laniera	<i>Laniera</i> [Wool Manufacturing]	Nihon Kasai Gakkai Ronbunshu	<i>Nihon Kasai Gakkai Ronbunshu</i> [Bulletin of the Japanese Association of Fire Science and Engineering]
Liteinoe Proizvod	<i>Liteinoe Proizvodstvo</i> [Foundry Practice]	Nihon Kikai Gakkaishi	<i>Nihon Kikai Gakkaishi</i> [Journal of the Japanese Society of Mechanical Engineers]
Lung	<i>Lung</i>	Nord Betong	<i>Nordisk Betong</i> [Scandinavian Concrete]
Luz y Fuerza	<i>Luz y Fuerza</i> [Light and Energy]	Norsk Plast	<i>Norsk Plast</i> [Norwegian Plastics]
Manage Sci	<i>Management Science</i>	Norsk VVS	<i>Norsk Forening for Varme-, Ventilasjon- og Sanitaerteknikk</i> [Norwegian Society for Heating, Ventilation and Sanitary Engineering]
Mar Pollut Bull	<i>Marine Pollution Bulletin</i>	Nucl Eng Des	<i>Nuclear Engineering and Design</i>
Maschinenbautech	<i>Maschinenbautechnik</i> [Machine Construction Engineering]	Nucl Technol	<i>Nuclear Technology</i>
Maschinenmarkt	<i>Maschinenmarkt</i> [Machinery Market]	Oesterr Feuerwehr	<i>Oesterreichische Feuerwehr</i> [Austrian Fire Service]
Maschinenschaden	<i>Maschinenschaden</i> [Machine Damage]	Ohm: Denki Zasshi	<i>Ohm: Denki Zasshi</i> [Ohm Journal]
Masch Werkzeug	<i>Maschine und Werkzeug</i> [Machines and Tools]	Omron Tech	<i>Omron Technics</i> [Omuron Tekunikusu]
Mass Emergencies	<i>Mass Emergencies</i>	Oper Res	<i>Operations Research</i>
Mater Eng	<i>Materials Engineering</i>	Opt Eng	<i>Optical Engineering</i>
Materialpruef	<i>Materialpruefung</i> [Materials Testing]	Pet Rev	<i>Petroleum Review</i>
Mater Maquin y Metodos Constr	<i>Materiales, Maquinaria y Metodos para la Construcción</i> [Construction Materials, Machinery and Methods]	Plant Eng	<i>Plant Engineering</i>
Matsushita Electr Ind, Nat Tech Rep	<i>Matsushita Electrical Industry, National Technical Report</i>	Plastforum	<i>Plastforum</i> [Plastics Forum]
Meas Control	<i>Measurement and Control</i>	Plasticconst	<i>Plasticconstruction/Bauen mit Kunststoffen/Plastics in Building/Plastiques et Construction</i>
Medd fran Statens Brandnamnd	<i>Meddelande fran Statens Brandnamnd</i> [Communications from the State Fire Administration]	Plastics Technol	<i>Plastics Technology</i>
Med Sci Law	<i>Medicine, Science, and the Law</i>	Plastics World	<i>Plastics World</i>
Melliand Textilber	<i>Melliand Textilberichte</i> [Melliand Textile Journal]	Plumb Eng	<i>Plumbing Engineer</i>
Metallverarbeitung	<i>Metallverarbeitung</i> [Metal Finishing]	Pozhar Delo	<i>Pozharnoye Delo</i> [Firefighting]
Mod Concr	<i>Modern Concrete</i>	Practitioner	<i>Practitioner</i>
Mod Healthcare	<i>Modern Healthcare</i>	Pr Cent Inst Ochr Pr	<i>Prace Centralnego Instytutu Ochrony Pracy</i> [Papers of the Central Occupational Safety Institute]
Mod Paint Coatings	<i>Modern Paint and Coatings</i>	Probl Projekt Hutn i Przem Maszyn	<i>Problemy</i>

EXPANSIONS OF JOURNAL ABBREVIATIONS

<i>Projektowe Hutnictwa i Przemysłu Maszynowego</i> [Planning Problems in Metallurgy and the Machine Industry]	and Metallurgy, Ostrava, Mining and Geological Series]
Prom Energ <i>Promyshlennaya Energetika</i> [Industrial Power]	Schadenprisma <i>Schadenprisma</i> [Damage Prism - Journal of Damage Prevention and Research]
Prot Civ Secur Ind <i>Protection Civile et Securite Industrielle</i> [Civil Protection and Industrial Security]	Schienenfahrzeuge <i>Schienenfahrzeuge</i> [Railway Vehicles]
Protivpozarna Zastita <i>Protivpozarna Zastita</i> [Fire Protection]	Schiff Hafen <i>Schiff und Hafen</i> [Ships and Ports]
Przegl Poz <i>Przegląd Pożarny</i> [Fire Review]	Schott Inf <i>Schott-Information</i> [Schott Information. Journal of the Jena Glass Co]
Prz Elektrotechn <i>Przegląd Elektrotechniczny</i> [Electrotechnical Review]	Schweisstechnik (Berlin) <i>Schweisstechnik (Berlin)</i> [Welding Technology (Berlin)]
Przem Drzew <i>Przemysł Drzewny</i> [Wood Industry]	Schweiz Feuerwehr Z <i>Schweizerische Feuerwehr-Zeitung</i> [Swiss Fire Service Journal]
Przem Spozyw <i>Przemysł Spożywczy</i> [Food Industry]	Science <i>Science</i>
Pulp Pap <i>Pulp and Paper</i>	Seewirtschaft <i>Seewirtschaft</i> [Merchant Marine]
Puranto Enjinia <i>Puranto Enjinia</i> [Plant Engineer]	Seisan to Denki <i>Seisan to Denki</i> [Production and Electricity]
Radio Eng Electron Phys <i>Radio Engineering and Electronic Physics</i>	Sekiyu Shiryo Geppo <i>Sekiyu Shiryo Geppo</i> [Monthly Report on the Petroleum Industry]
Railw Eng Abstr <i>Railway Engineering Abstracts</i> [Nihon Kokuyū Tetsudō Gijutsu Kenkyūsho]	Sekiyu to Sekiyu Kogaku <i>Sekiyu to Sekiyu Kogaku</i> [Petroleum and Petrochemicals]
Rech Aerospat <i>Recherche Aerospatiale</i>	Sharyo to Denki <i>Sharyo to Denki</i> [Railway Car and Electric Equipment]
Record <i>Record</i>	Shisetsu <i>Shisetsu Nenpo</i> [Annual Report of Japan Railway Civil Engineering Association]
Reito Kucho Gijutsu <i>Reito Kucho Gijutsu</i> [Techniques of Refrigeration and Air Conditioning]	Sigurnost <i>Sigurnost</i> [Safety]
Res/Dev <i>Research/Development</i>	Skilling Min Rev <i>Skills' Mining Review</i>
Rev Gen Therm <i>Revue Generale de Thermique</i> [General Thermal Review]	Soda to Enso <i>Sōda to Enso</i> [Soda and Chlorine]
Rev Secur <i>Revue de la Securite</i> [Safety Review]	Solar Turbines Internat <i>Solar Turbines International</i>
Rev Tech Feu <i>Revue Technique du Feu</i> [Fire Engineering Review]	Specifying Engr <i>Specifying Engineer</i>
Riv Combust <i>La Rivista dei Combustibili</i> [Fuel Review]	Stahlbau <i>Der Stahlbau</i> [Steel Construction]
Riv Med Aeron Spaziale ... <i>Rivista di Medicina Aeronautica e Spaziale</i> [Aeronautical and Space Medical Review]	Staub Reinhaltung der Luft <i>Staub; Reinhaltung der Luft</i> [Dust; Air Purification]
Rubber Chem Technol .. <i>Rubber Chemistry and Technology</i>	Steir Feuerwehrl <i>Steirisches Feuerwehrblatt</i> [Styrian Fire Services Journal]
Rural Urban Roads <i>Rural and Urban Roads</i>	Stroit Mekh Raschet Soor <i>Stroitel'naya Mekhanika i Raschet Sooruzheniy</i> [Structural Mechanics and Calculation of Structures]
S Afr Min Eng J <i>South African Mining and Engineering Journal</i>	Suchiro Dezain <i>Suchiro Dezain</i> [Steel Design]
Saf Sea Internat <i>Safety at Sea International</i>	Svaroch Proiz-vo <i>Svarochnoe Proizvodstvo</i> [Welding Practice]
Saiko to Hoan <i>Saiko to Hoan</i> [Mining and Safety]	TAB Tech Bau <i>TAB Technischer Bau</i> [TAB Building Technology]
Sangyo Anzen Kenkyushu Gijutsu Shiryo <i>Sangyo Anzen Kenkyushu Gijutsu Shiryo</i> [Research Institute of Industrial Safety, Technical Note]	Takenaka Tech Res Rep <i>Takenaka Technical Research Report</i>
Sanit Heiz Tech <i>Sanitaer + Heizungstechnik</i> [Plumbing and Heating Engineering]	Tanker Bulker Internat <i>Tanker and Bulker International</i>
Sapeur Pompier <i>Sapeur Pompier</i> [Firefighter]	Tanko Shin Gijutsu <i>Tanko Shin Gijutsu</i> [New Technology of Mining]
Sb Tr VNII Protivopozhar Oborony <i>Sbornik Trudov Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Protivopozharnoy Oborony</i> [Digest of Papers of the All-Union Fire Protection Research Institute]	Technica (Switz) <i>Technica (Switzerland)</i> [Technology]
Sb Ved Pr Vys Sk Banske <i>Sbornik Vedeckych Praci Vysoke Skoly Banske v Ostrave, Rada Hornicko-Geologicka</i> [Transactions of the Institute of Mining	Tech Rundsch <i>Technische Rundschau</i> [Technical Review]
	Tech Text <i>Technische Textilien</i> [Technical Textiles]
	Tech Ueberwach <i>Technische Ueberwachung</i>

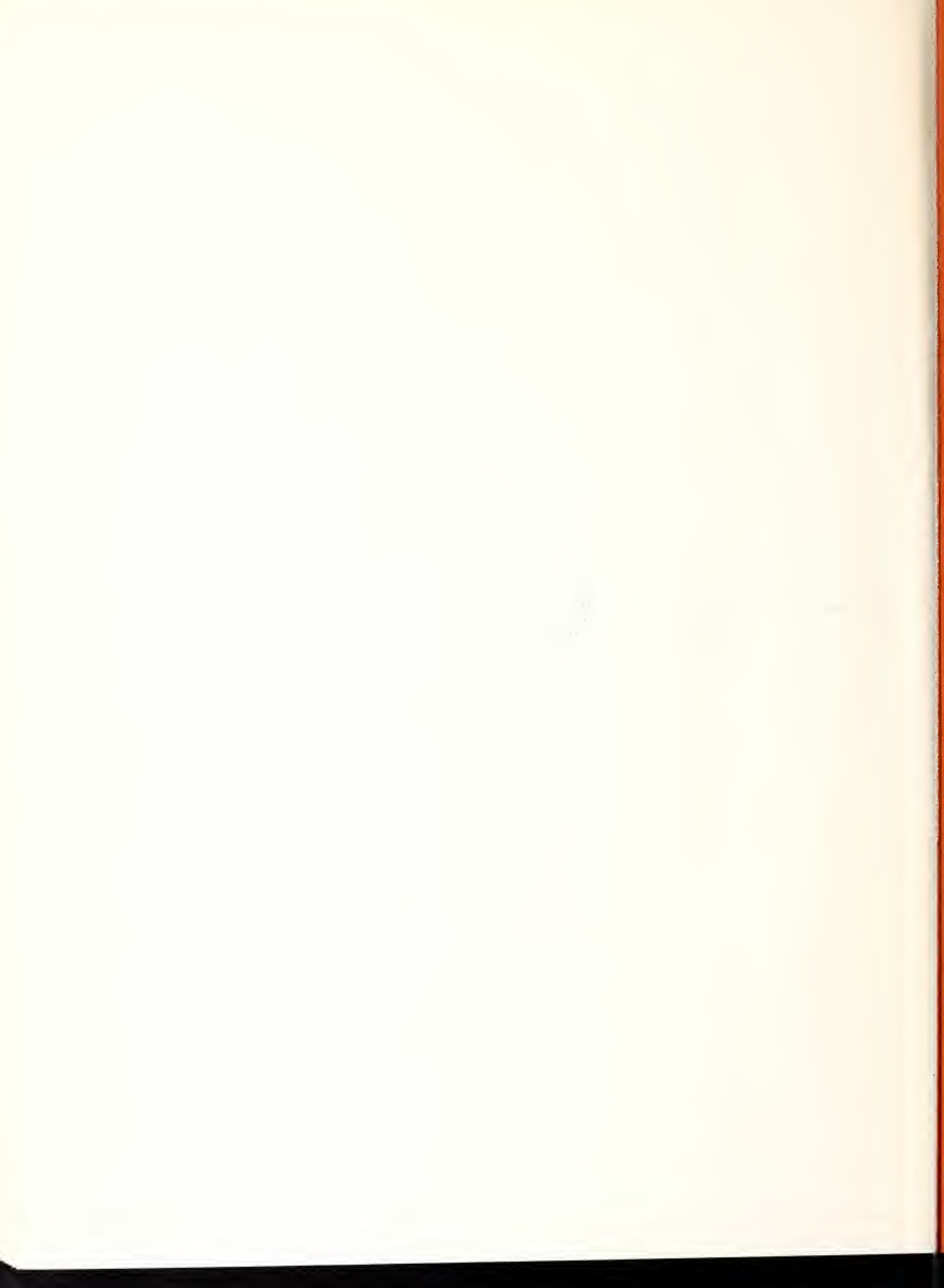
EXPANSIONS OF JOURNAL ABBREVIATIONS

[Technical Security Supervision]	<i>Slaskiej</i> [Scientific Reports of the Silesian Polytechnic]
Tetsudo Gijutsu Kenkyu Shiryo..... <i>Tetsudo Gijutsu Kenkyu Shiryo</i> [Journal of Railway Engineering Research]	Zesz Probl Postepow Nauk Roln <i>Zeszyty Problemowe Postepow Nauk Rolniczych</i> [Papers on Progress in Agricultural Science]
Text Chem Color..... <i>Textile Chemist and Colorist</i>	Zosen Gijutsu Kenkyu Kaihatsu Yoyakushu <i>Zosen Gijutsu Kenkyu Kaihatsu Yoyakushu</i> [Development of Shipbuilding Techniques, Digest Review]
Textilveredlung <i>Textilveredlung</i> [Textile Finishing]	Z Rechtsmed <i>Zeitschrift fuer Rechtsmedizin</i> [Journal of Forensic Medicine]
Text Inst Ind <i>Textile Institute and Industry</i>	Z Schweisstech <i>Zeitschrift fuer Schweissttechnik</i> [Journal of Welding Technology]
Text Month <i>Textile Monthly</i>	ZS Magazin..... <i>Zivilschutz Magazin</i> [Civil Defense Journal]
Text Res J <i>Textile Research Journal</i>	
Trasp Ind <i>Trasporti Industriali</i> [Industrial Transportation]	
Tr Tall Politekh In-ta <i>Trudy Tallinskogo Politeknicheskogo Instituta</i> [Transactions of the Tallin Polytechnic Institute]	
TU Braunschweig, Inst Baustoffkunde Stahlbetonbau.	
Schriftenreihe <i>Technische Universitaet Braunschweig. Institut fuer Baustoffkunde und Stahlbetonbau. Schriftenreihe</i> [Braunschweig Technical University, Institute for Materials and Reinforced Concrete Construction. Publications]	
Ugol Ukrainy <i>Ugol Ukrainy</i> [Ukrainian Coal]	
Ugol (USSR) <i>Ugol (USSR)</i> [Coal (USSR)]	
Umsch Wiss Tech <i>Umschau in Wissenschaft und Technik</i> [Science and Technology Review]	
Unser Brandschutz <i>Unser Brandschutz</i> [Our Fire Protection]	
Urban Affairs Quart..... <i>Urban Affairs Quarterly</i>	
Urban Data Service Report..... <i>Urban Data Service Report</i>	
Usine Nouvelle <i>Usine Nouvelle</i> [New Plants]	
Vaeg- och Vattenbygg <i>Vaeg- och Vattenbyggaren</i> [Highway and Waterway Engineering]	
Varme Sanitetstekn..... <i>Varme- och Sanitetsteknik</i> [Thermal and Sanitary Engineering]	
VDI Z..... <i>Zeitschrift des Vereins Deutscher Ingenieure</i> [Journal of the German Engineers Society]	
Verkehrsrundsch <i>Verkehrsrundschau</i> [Traffic Review]	
VFDB Z..... <i>Zeitschrift der Vereinigung zur Foerderung des Deutschen Brandschutzes</i> [Journal of the Association for the Advancement of Fire Protection in Germany]	
VKF Mitt..... <i>Mitteilungen der Vereinigung Kantonaler Feuerversicherungen</i> [Communications of the Association of Cantonal Fire Insurance Companies]	
VUZ. Izv. Gorn Zh..... <i>Vyshhie Uchebnye Zavedeniya. Izvestiya. Gornyy Zhurnal</i> [Advanced Educational Institutions. Bulletin. Mining Journal]	
Weather (UK) <i>Weather (UK)</i>	
Weld World <i>Welding in the World</i>	
Yuatsu Gijutsu <i>Yuatsu Gijutsu</i> [Hydraulics Engineering]	
Zentralbl Arbeitsmed Arbeitsschutz <i>Zentralblatt fuer Arbeitsmedizin und Arbeitsschutz</i> [Journal of Industrial Medicine and Occupational Safety]	
Zesz Nauk Politech Slask <i>Zeszyty Naukowe Politechniki</i>	











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